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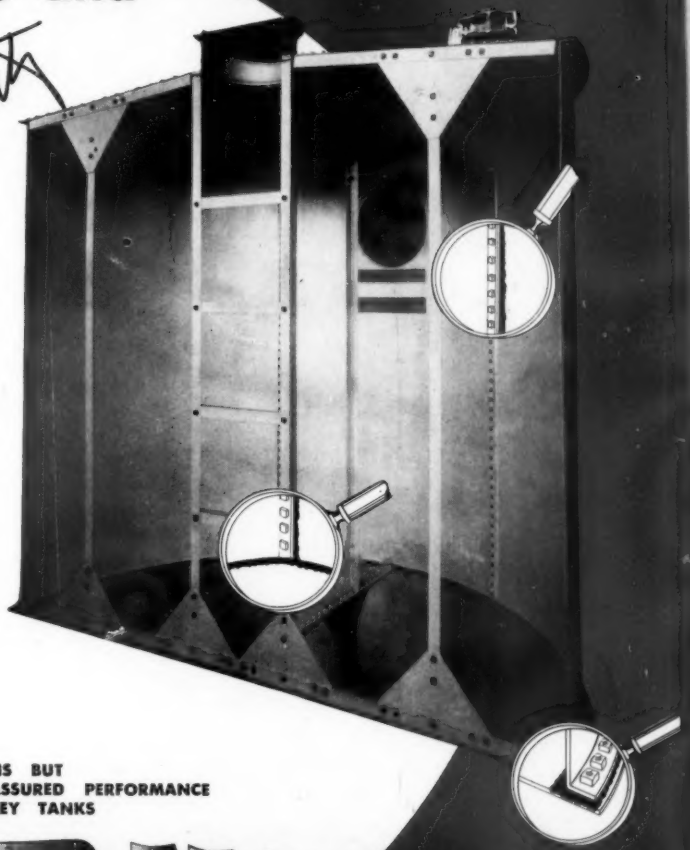

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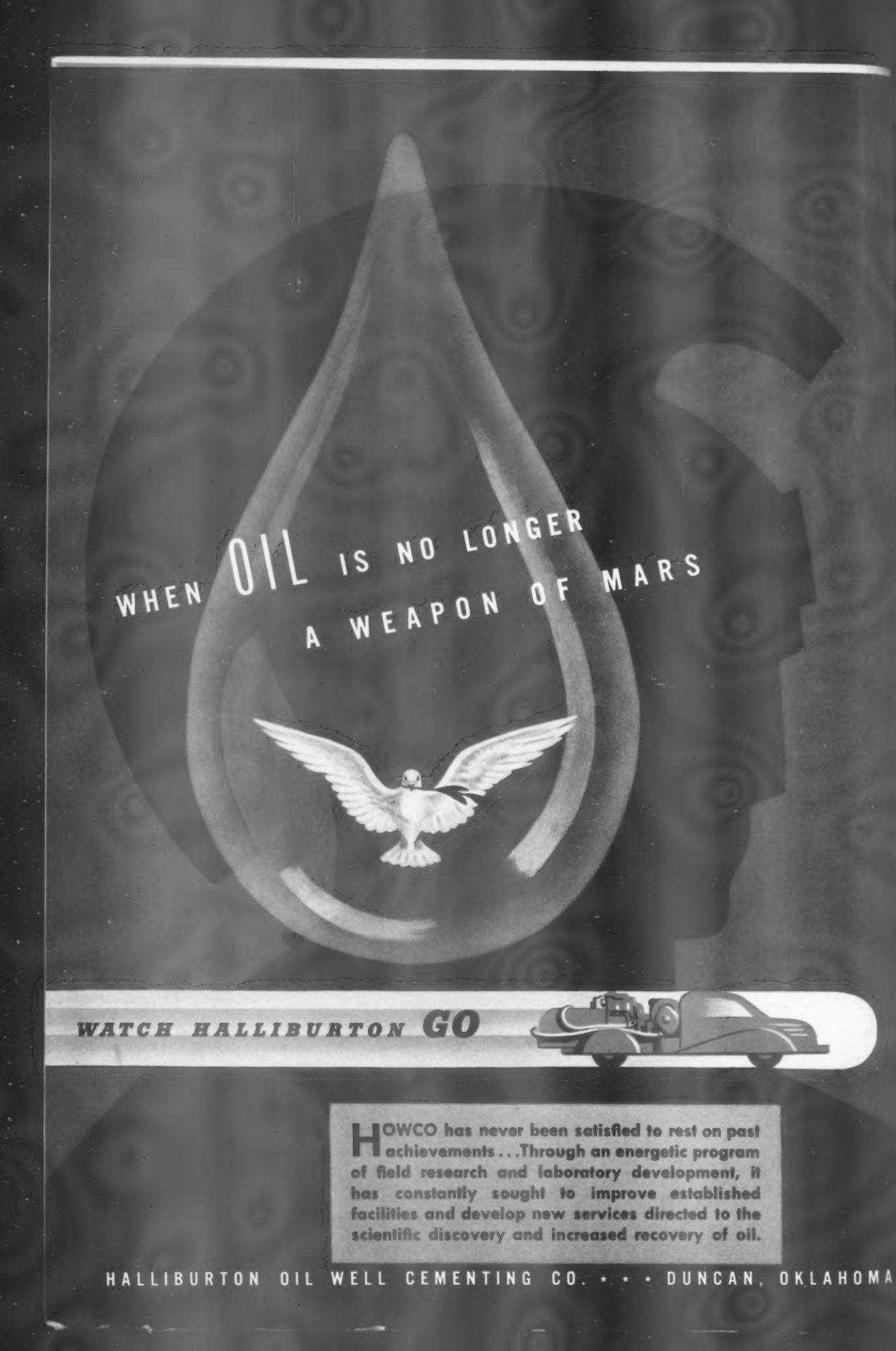

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published weekly by the

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211 S. CHEYENNE AVE., TULSA 1, OKLAHOMA

Subscription rate to the petroleum industry, United States and foreign, 1 year, $6.00; 2 years, $10.00; 3 years, $12.00; 5 years, $15.00. Single copies, 20 cents. Back copies, when over a year old, 50 cents. Entered as second-class mail matter at Tulsa, Okla., under Act of March 3, 1879. Copyright 1945, by The Petroleum Publishing Co.

Vol. 43, No. 39 February 3, 1945

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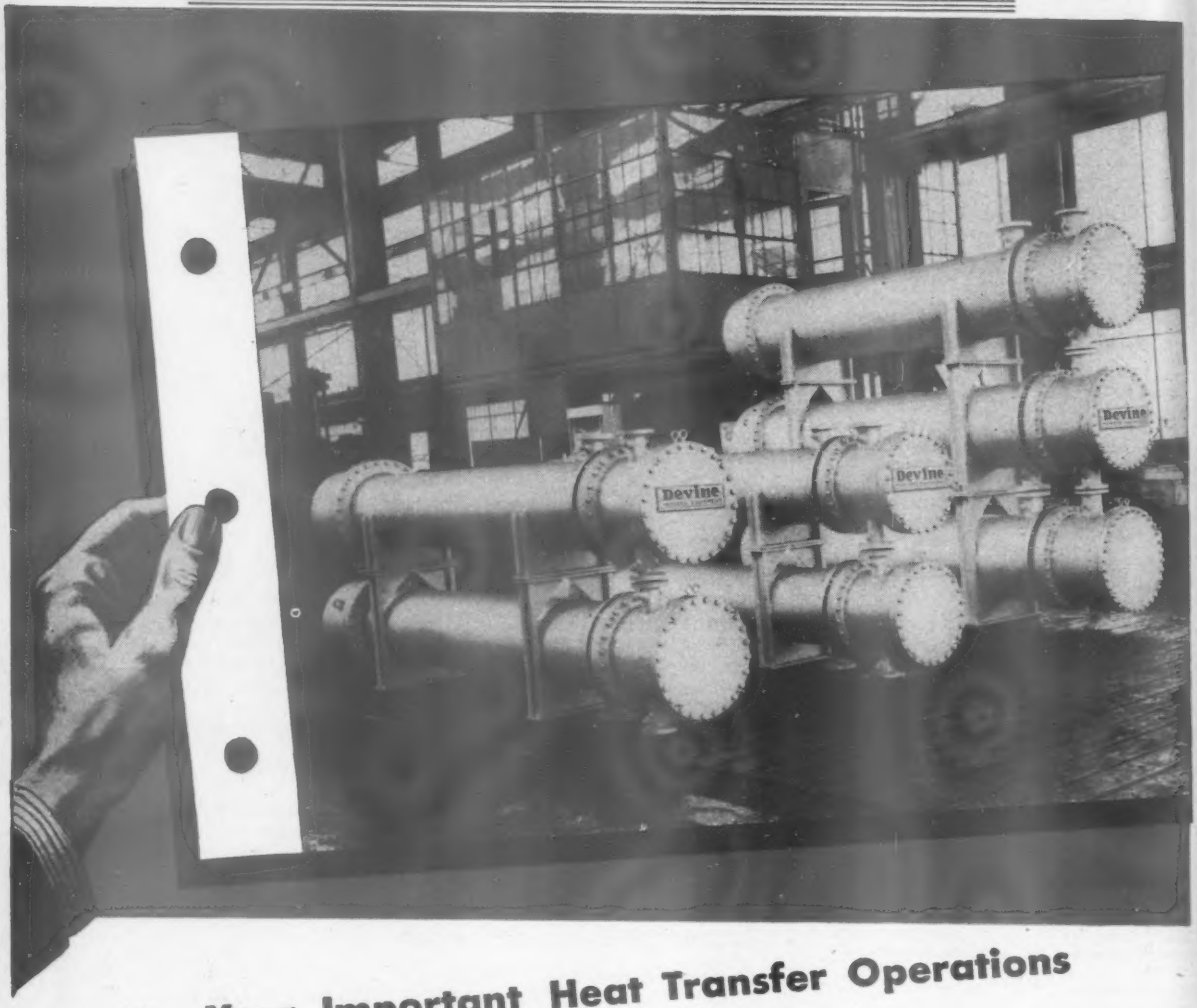

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the OIL AND GAS JOURNAL

Trends

Crude-Oil Production
By States — Page 86

CRUDE-OIL STOCKS 221,628,000 bbl. as of January 20—up 514,000 bbl. One year ago 238,814,000 bbl.

GASOLINE STOCKS 88,708,000 bbl. as of January 20—up 894,000 bbl. One year ago 79,444,000 bbl.

RESIDUAL FUEL-OIL STOCKS 52,554,000 bbl. as of January 20—down 1,653,000 bbl. One year ago 53,121,000 bbl.

GAS OIL AND DISTILLATE STOCKS 35,041,000 bbl. as of January 20—down 1,369,000 bbl. One year ago 38,112,000 bbl.

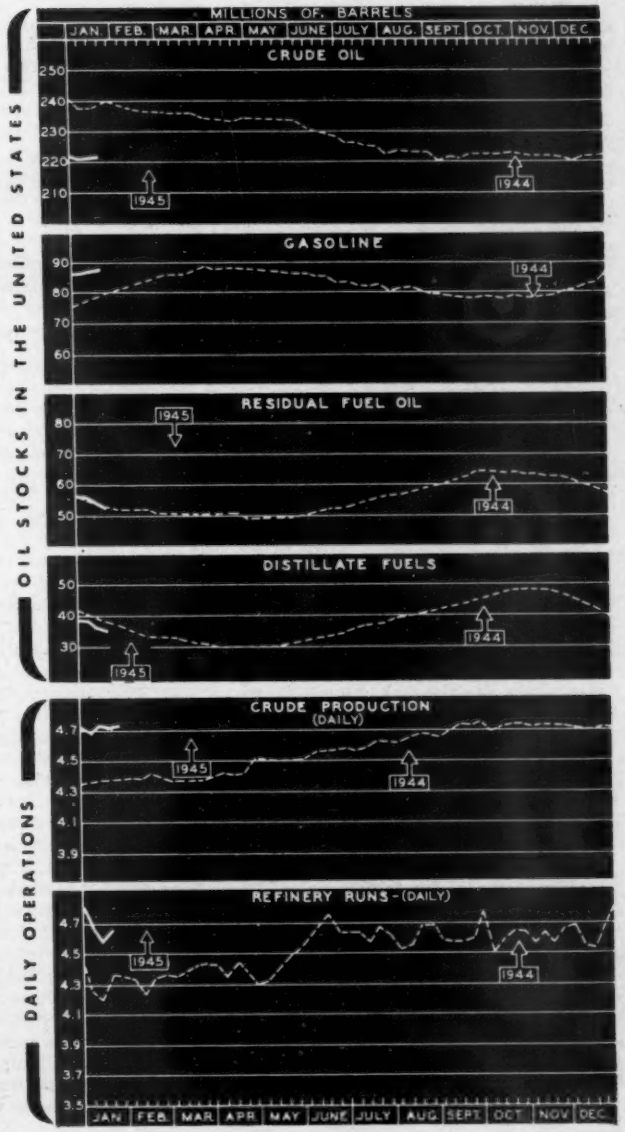
CRUDE OIL PRODUCTION 4,736,700 bbl. as of January 27—up 25,900 bbl. One year ago 4,394,525 bbl.

REFINERY RUNS 4,686,000 bbl. daily week ended January 20—up 116,000 bbl. One year ago 4,372,000 bbl.

REPRESENTATIVES of the war agencies and those within the oil industry who have the direct responsibility of maintaining and expanding the nation's crude-oil production are finding that the solutions to their problems hinge largely on the status of the industry's major pools. As reported in this publication's Annual Issue last week, there were a large number of new discoveries in 1944, but the reserves credited to them were small in relation to the projected requirements for this year. The production of most of these newer fields will be expanded, but buyers of crude oil will continue to look to a comparatively few older areas for bulk of their supplies.

ACCORDING to the reserve checks as of the first of this year, 30 major fields each with reserves in excess of 100,000,000 bbl., account for 9,350,000,000 bbl. or 45 per cent of the national total of 20,514,739,000 bbl. This recapitulation of 100,000,000-bbl. fields did not include the reserve data of entire counties, such as Wichita, Gray and Hutchinson, in Texas. These counties embrace a number of older fields which, for convenience, are grouped in estimating remaining reserves.

LARGE single reserves are confined to a small part of the oil industry. No field east of the Mississippi River is credited with a reserve of 100,000,000 bbl., and the same situation applies to Kansas, Louisiana, Mississippi and Arkansas and all of the Rocky Mountain states except Wyoming. California's supplies are concentrated in eight areas whose remaining reserves of 1,552,240,000 bbl. are equal to 47 per cent of the state's total. Wyoming's two major areas, which were greatly extended last year, have nearly 50 per cent of the state's reserves. Six producing areas in West Texas are credited with 66 per cent of its proven supplies. The East Texas and Van pools have 86 per cent of all the reserves in that part of the state. The Lower and Upper Gulf Coasts must look to nine fields for 64 per cent of their future oil, according to the January 1 estimates. More than one-third of New Mexico's reserve is credited to two fields. West Edmond is Oklahoma's only field now in the major listing. The nation's five largest fields account for 21 per cent of its reserves. These are: East Texas, 2,530,000,000 bbl.; Conroe, 515,000,000 bbl.; Wasson, 482,000,000 bbl.; Slaughter and Dean, 400,000,000 bbl.; Tom O'Connor, 385,000,000 bbl.



Russian Advance Sweeps Over Important Nazi Oil Sources

by Henry D. Ralph

WASHINGTON. — Russian Army advances in recent weeks have swept over all the oil fields and known refinery locations in Poland and Hungary, leaving Germany only the oil fields and refineries near Vienna, Hamburg, and the few insignificant fields in other parts of Germany, Austria and Czechoslovakia.

In addition the Red Army has either taken or is now seriously threatening large synthetic gasoline plants in the vicinity of Breslau in Silesia. Meanwhile, British and American heavy bombing forces appear to have stepped up the tempo of their continuing raids on all known aboveground synthetic-oil plants in other parts of Germany.

The results, in the opinion of Washington experts, have left Germany desperately short of liquid fuels and lubricants.

Polish crude-oil production of any consequence was centered in fields in Galicia in southern Poland, chiefly near Lwow, Potok, Krosno, Majdan, Bitkow, and Klimkowa. This area is now entirely in Russian hands.

An important German source of crude oil was the Hungarian production, centered near Lake Balaton. Whether the Red Army is actually in firm possession of this area is not clear from recent dispatches, but at any rate the production there is lost to the Germans because it all moved to refineries in the vicinity of Budapest which is in Russian hands.

Vienna Area Still Retained

The only major source of crude remaining in German hands is in the Vienna area, where half a dozen refineries are also located. Russian pinchers are advancing toward Vienna up the Danube and around northern Czechoslovakia, but much mountainous country stands in the way of both arms and the Germans are expected to defend the Vienna region to the bitter end.

Germany proper also has some crude-oil production, most of it in the vicinity of Hamburg, which presumably will not be captured until the disintegration of Germany.

All Polish oil refineries have now been captured by the Russians though it is not known here what condition they may be in at present. These refineries are understood to have a total capacity of approximately 800,000 metric tons per year, which would be the equivalent of roughly 16,500 bbl. per day.

The principal Polish refineries are Vacuum Oil Co. at Szechowice, 1,500 bbl. per day; Galicja-Malopolska at Jedlicze, 1,500 bbl.; Polski-Zwiazhowe-Malopolska at Trzebinja, 2,000 bbl.; Jalso-Gartenberg and Schreyer at Nieglowice, 14,000 bbl.; Polmin at Drohubycz, 3,300 bbl.; Galicja at Drohubycz, 2,800 bbl.; Nafta-Malopolska at Drohubycz, 1,200 bbl.; Galicja-Malopolska at Glinik-Mariampolski, 1,700 bbl., and Przemyslu Nafta-Gozy Ziemne at Lwow, 800 bbl. per day.

Most of the Hungarian oil fields are west of Budapest, chiefly near Lovaszi, Peklenica, Selnica, and Budafupuszta. Hungarian refineries, with a total capacity of around 7,600 bbl. per day, are chiefly in the Budapest area. The entire oil industry of Hungary is either in Russian hands or is imminently threatened by the Red Army and probably of no use to the Germans.

Remaining Nazi Oil

Crude refining capacity in Germany and all territories at one time occupied by the Germans has been estimated to total approximately 26,000,000 metric tons per year (35° gravity crude runs about 7.5 bbl. to the metric ton), but Germany did not have sufficient crude to run all the captured refineries in France, the Low Countries, Scandinavia, and other locations.

Discounting bombing damage and new construction in recent months, crude refineries left in Germany proper have annual capacity of some 2,505,000 tons; Austria, 800,000 tons; Slovakia, 240,000 tons; Bohemia, 350,000 tons; a total of some 4,000,000 metric tons. Small capacity in the Netherlands, Norway, Denmark and northern Italy is probably useless because crude supply is lacking.

The bulk of Germany's liquid fuel probably has been coming from synthetic plants. These have been favorite targets for American and British heavy bombers, but evidently the bombers have not destroyed them all and there are reports that the Germans have built new synthetic gasoline plants underground or otherwise well protected.

A recent estimate was that Germany had hydrogenation plants with a total capacity of 5,595,000 metric tons of motor gasoline per year, including 20,000 tons capacity in France which is now lost; and Fischer-Tropsch plants with a total capacity of some 1,375,000 metric tons per year, including 30,000 tons in France and 30,000 tons in Italy.

Six of the Fischer-Tropsch plants, with a total capacity of 755,000 tons, are understood to be located in the Ruhr, an area now threatened by American and British ground forces and certainly easy targets for Allied bombers. The others, with a combined capacity of 450,000 tons, are at Leipzig in Central Germany, while a 110,000-ton plant is at Deschowitz in Silesia. This is on the German-Polish border north of the town of Katowice, an area where the Russian forces were making rapid progress last week, so this plant may now be lost to the Germans.

Hydrogenation Plants

Also in German Silesia are two of Germany's largest hydrogenation plants, Bleckhammer North and Bleckhammer South, each with capacity of 500,000 tons, located somewhat west of Katowice, and it may be assumed that if these are not already captured by the Russians they are seriously threatened. Silesia produces a large part of the coal used by hydrogenation plants located in other parts of Germany, and the Russian success in cutting this off entirely leaves the Germans drastically short of raw material for synthetic-fuel production. Another hydrogenation plant is believed to be located at Oswiecim in Polish Silesia somewhat west of Krakow, and probably is also in Russian hands.

Germany's hydrogenation plants are believed to be rather well scattered around the country, but a large percentage of her capacity is, or was, centered in the Ruhr Valley and near Cologne, the area of largest coal production.

Many authorities believe that Germany has enormously increased her indigenous crude production during the war and that Central Europe may now be considered one of the important oil-producing areas of the world.

Before the war crude production in Germany proper was estimated at about 552,000 metric tons per year, but there is some evidence that production now may be as much as twice that figure, or in the neighborhood of 20,000 bbl. per day.

The really big oil find in Europe has been in the Vienna area of Austria. While Austrian production before the war was insignificant, amounting to some 72,000 tons per year, estimates of present crude production range from 1,375,000 to up-

wards of 2,000,000 tons per year. The latter figure would be about 40,000 bbl. per day. Austrian refineries are around Vienna and Bratislavia. In addition, Germany still has some crude production from Czechoslovakia, probably some 20,000 to 30,000 tons per year.

Hungarian Production

Hungarian production, now lost to the Germans, likewise increased greatly during the war as a result of new discoveries and intensive drilling. Some estimates place recent Hungarian production at 700,000 to 800,000 tons per year, compared with a 1938 output of 43,000 tons.

On the other hand, Polish crude production is believed to have declined during the war, from some 500,000 tons to perhaps 350,000 tons annually.

A general estimate was that about one-third of Germany's liquid fuel came from synthetic plants, one-third from Rumania, and the remainder from other crude. Germany has now lost all the Rumanian, Hungarian and Polish crude and refining capacity, also the small production in French Alsace, probably around 75,000 tons per year, and Estonian shale oil, estimated at 150,000 tons annually. Polish and French crudes were particularly good for lubricants. In addition, synthetic plants, refineries, and storage depots throughout German territory have been subjected to a carefully planned campaign of heavy bombing.

Predictions that Germany would soon run short of oil have been made periodically in Allied quarters for the past 5 years, but there are evidences of a real shortage now. In addition to front-line reports of German motorized equipment being captured with dry fuel tanks, which could be due only to local supply difficulties, neutral sources report that Germans are using gas generators for virtually all internal transportation, are rationing charcoal for use in generators, and are using timbers from bombed houses, peat, and lignite briquettes as fuel for generators.

West Pampa Repressuring Organization Is Completed

In the February 10 issue the Journal will present a special article which will discuss the important engineering features of the West Pampa oil field and the program of the repressuring association. Several graphical illustrations will accompany the article.

FOLLOWING intensive studies of the geological and engineering features of the West Pampa oil field, organizational work of the West Pampa Repressuring Association has been completed and first meeting of the group is scheduled for February 15 at Amarillo.

Plans for the gas repressuring project embrace practically 100 per cent of the pool area which produces from the dolomite pay of the lower Permian. Included are 26 operators with a total of some 101 different leases totaling 14,320 acres and 950 oil wells. Present production is approximately 14,500 bbl. per day. Ultimate recovery will be increased, operators expect, by 17,250,000 bbl. minimum to 40,250,000 bbl. maximum as a result of the repressuring program.

The program is cooperative in nature, with each operator retaining ownership and operation of individual properties. Surplus residue gas will be used for injection, after treatment, dehydration, and compression by new equipment which will be installed as an adjunct to certain of the gasoline plants now serving the field.

Repressuring technique and operations will be under the direction of an operating-executive committee of the Association, and a pool engineering staff will be set up to handle the repressure functions and duties.

Engineers who have been active in the preliminary studies state the West Pampa pool program eventually may rank as one of the largest such operations in the country. It is termed particularly outstanding not only as a conservation and oil-recovery measure, but also as unusual in the direct, equitable and thorough manner in which such a large and complex undertaking is handled on cooperative basis.

The West Pampa field is centrally located in the long trend of pools making up the Texas Panhandle oil producing area, and it is possible that the initial work will later spread to some of the other nearby areas, which in total comprise 153,058 productive acres on which are located 5,844 oil wells.

Argentine Operations Severely Reduced

NEW YORK.—Argentina's petroleum industry is virtually at a standstill, so far as new projects are concerned, due to lack of materials and equipment, it is learned here this week from a well-informed source. Despite the nation's present need for increased petroleum supplies, little or nothing can be done under existing conditions to make them available. For several years there have been no important additions to refining, production, marketing or transportation facilities, nor is anything planned at this time.

Petroleum products are being severely rationed, and even on this basis, Argentina is producing only about 75 per cent of its requirements, it is reported. Gasoline is rationed by means of a card system and by coloring the gasoline. Blue gasoline is for civilian motorists and yellow gasoline for trucks, buses and taxicabs. Violations of rationing regulations are punishable by suspension of driving privileges for 2 to 3 months.

Kerosene and fuel oil supplies must be curtailed even more drastically than gasoline. Argentina is a large consumer of kerosene, used for domestic heating and cooking. Long lines forming for kerosene rations are often seen in Argentine cities. Diesel oil and heavy fuel oil, formerly imported in large quantities, are more scarce than gasoline at the present time. Argentina also is extremely short of coal, and therefore has to resort largely to wood to make up fuel deficiencies.

Due to lack of equipment, drilling for oil in Argentina is at a reduced scale. Rigs now operating are those which have been in service for an extended period and are maintained only with difficulty. No important new oil discoveries have been reported, it is said.

Several years ago a 1,100-mile oil pipe line was contemplated from the Mendoza oil district in western Argentina to a terminal site on the Rio Parana, but plans were abandoned because of the war.

Geological Association's Annual Meeting Canceled

Complying with the request of James F. Byrnes, war mobilization director, the executive committee of American Association of Petroleum Geologists has canceled the association's annual meeting, scheduled for March 20-22, in Tulsa. The annual meeting of the business committee, for transaction of necessary business, will be held at the Mayo Hotel, Tulsa, March 27.

I.P.A.A. Membership Asked to Vote on Price Differential

OKLAHOMA CITY.—The foundation was laid here this week by the Independent Petroleum Association of America for continuing the fight for higher crude-oil prices and for administration which will prevent cheap foreign oil from strangling the domestic producer.

"An inadequate price for oil brought about by uncontrolled domestic production or from a flood of cheap foreign oil can reduce our domestic oil industry to one of impotence," declared Ralph T. Zook, Bradford, Pa., president of the I.P.A.A., who addressed the luncheon meeting of directors and vice presidents January 30.

The question of a permanent price differential for stripper production and secondary-recovery oil will be referred to the I.P.A.A. membership by mail ballot. The membership will vote on three questions: (1) Do you favor a differential for stripper and secondary-recovery production? (2) Do you favor payment for such differential from public funds (subsidy)? (3) What other plan for such differential payment do you favor?

The price-differential question was introduced by officers of the National Stripper Well Association who are also executives in the I.P.A.A. Vice presidents and executive committeemen of the I.P.A.A. elected to poll the membership before committing the association for or against the permanent differential, a program which already has been endorsed by the N.S.W.A.

About 50 to 60 officers, directors and members of the association attended the 2-day conference which was called for discussion of 1945 objectives and adoption of methods to implement the program. Russell B. Brown, Washington, general counsel, warned that materials will be critically short during the second and third quarters and declared that extreme difficulty will be met in producing the required volume to support the military campaign.

Doubt was expressed by Zook that the domestic industry can long continue to supply the bulk of Allied military requirements unless previously proven economic factors are permitted to bolster productive capacity.

"The oil industry cannot function properly," Zook declared, "with the price index for crude oil so far out of line with other commodities as it is at present. Producers, who have struggled through this war era under frozen prices while costs have risen 30 per cent and discovery costs have gone up 300 per cent over the 1940 figure, cannot adequately perform the task that lies ahead, either during the war or the postwar periods. The industry has been liquidating reserves acquired at costs far below present replacement costs. If it were not for this, it could not have continued to function with wages at an index of 188, all commodities at 105, and crude oil at only 65.

Cost-Survey Methods

"The present cost survey on crude oil and refined products now being conducted by the Office of Price Administration should lead to a correction of the present inadequate ceilings on prices. The OPA, although long delayed, has now appointed one of the most constructive and capable industry advisory committees in my experience. The form for obtaining cost figures will be sent to a list of producers carefully selected to give a cross-section of the industry, in this manner making the figures available at an early date without undue hardship on industry or government. The limited scope of the list places a responsibility on those who receive the questionnaire to furnish the information requested so that a true cost picture on production will be obtained. My information is that a similar committee is being planned for refining and marketing.

"There are some who are ready to write off the United States as a strong producing nation and depend on the importation of foreign oil. Others are planning to use the greatest oil market of the world, the United States, to cure the ills of other countries at the expense of our country. The independent producer sees in such thinking a definite threat to his existence.

"The domestic oil producer has been on a starvation diet of inadequate price, manpower and materials. Before planning its demise it would be well to turn it loose and give it an opportunity to demonstrate its ability to replace oil reserves depleted during the war and rebuild the producing capacity of the nation.

"Our future security and well-being demand that industry and government set to work earnestly and intelligently to provide a program which will lay great stress upon the finding and development of crude-oil reserves within the boundaries of the United States."

Suman Is Vice President Of Jersey Standard

TRANSFER of the Southwestern oil industry's "one man public relations department" to a position carrying international responsibilities was made known last week with election of John R. Suman, Houston, to positions as vice president and a member of the "big board" of the Standard Oil Co. (New Jersey).

The position of vice president with the Jersey company became vacant with resignation of Wallace E. Pratt from that office. Pratt continues as a member of the board and of the executive committee, extending his 30-year service with Standard of New Jersey and its affiliate, Humble Oil & Refining Co.

Suman, who numbers his acquaintances in the oil industry by thousands and is referred to as "one of the best-liked executives in the business", retires as vice president and a director of Humble to join the organization of the parent company. He became a director of the Humble organization in 1927 and was made

JOHN R. SUMAN

vice president in charge of production in 1933. He is credited with an important part in the development that has made Humble the leading oil producer in the United States.

Suman is a director and former president of the A.I.M.E. from which he received the Lucas Medal in 1943. He worked successively as chief engineer and later as general manager for Rio Bravo Oil Co., a subsidiary of the Southern Pacific Railroad Co. as technical superintendent for Roxana Petroleum Corp., and as general manager of operations in Texas for the old Associated Oil Co. of California before joining Humble in 1927.

THIS WEEK

PRICES— Hopes revived for general price advance. . . . Oil men feel case is irrefragable. . . . Realists, however, still remember adamant stand of Vinson and Byrnes, see tough job ahead. . . . OPA's consent to gather replacement-cost data merely the first step. . . . ¶Several new fields added to subsidy list. . . . ¶Purchasers shifting burden of proving subsidy qualifications to producers. . . . Buyers, in fact, are holding up subsidy disbursements, to consistently tardy producers, until all supporting data are supplied. . . . One purchaser recently had $500,000 tied up by Defense Supplies Corp. because producers were slow in filing required forms. . . .

MATERIALS— First tightening of steel supplies becoming noticeable. . . . First impression of greater bomb and rocket program hitting tubular goods. . . . Second quarter shortage to be most severe, modification thereafter held probable. . . . ¶Production rate delicately balanced with completions at present, meaning shortages and heavier reliance on storage through midyear. . . .

PRODUCTION— Industry running about 20,000 bbl. per day behind production quota at start of February. . . . Increased output in Texas brings state up to schedule. . . . Rise of 8,000 bbl. in California lifts District 5 to full quota. . . .

INTERNATIONAL— Revised Anglo-American agreement nearly ready for submission to White House. . . . Definite protection against antitrust laws for participating companies only remaining issue. . . . Oil companies unwilling to accept verbal assurance of immunity from attorney general. . . . Fear deep seated that change in administration might result in prosecution. . . . Industry insists on positive actions, not placations. . . .

REFINING— Less expensive method of producing rare chemical thiophene from petroleum hydrocarbons. . . . Experimental field vastly broadened by reduction in cost. . . . ¶War plant operators display avid interest in replacement of Jones with Wallace at head of RFC and subsidiaries. . . . Senate disposition of George bill and Wallace nomination may exert much influence on postwar refining. . . .

STOCKS— Weekly breakdown of motor fuel inventory shows volumes of military and civilian supplies for first time. . . . Civilian stocks slightly more than half of total. . . . Military storage of 42,926,000 bbl. includes aviation gasoline compared to 35,983,000 bbl. a year ago. . . . ¶Substantial reductions reported in kerosene, distillate and residual fuel. . . .

TRANSPORTATION— More severe regulations on tank cars producing first improvement in rail shipments. . . . Maximum increase will not be adequate to avert local shortages. . . . ¶Weather in eastern area hampering rail movement, putting heavy drain on petroleum fuels. . . .

Intense competition for gasoline-supply contracts at new airports indicates that the industry is confident they will provide outlets for substantial gallonage during and after the war. Here, Milton N. Weir, extreme right, assistant to the vice president of the Gulf Oil Corp., witnesses execution of a management contract on one of the newest and largest airports in the country. Gulf was given a subconcessionaire contract for the rights to petroleum sales at the airport, outbidding several other applicants. Herbert C. Gerlach, Westchester County (New York) executive, signs the concession agreement which turns over the management of the airport near White Plains to the North American Airport Corp. With him are Edward C. Rowe, James C. Harding, Richard H. Levet, and Weir

Antitrust Protection Only Issue Remaining in Revised Pact

WASHINGTON.—Reconciliation of differences between oil industry representatives and government officials over the language in the Anglo-American petroleum agreement was virtually completed this week. The only problem remaining unsolved was how specifically to satisfy the industry representatives on their insistence that definite protection must be provided against possible prosecution at some later date under the Sherman antitrust law. The industry, it is understood, will not be satisfied with verbal reassurances from the attorney general because such protection is potentially nullifiable by a change in administration.

The president's committee on the petroleum agreement, composed of cabinet officers and their advisers, reported substantial progress in consolidating positions of the industry, State, Justice, War and Navy departments and the Foreign Economic Administration.

Revisions in the agreement, when completed, will be submitted to the White House for consideration and for determination of action preliminary to meeting again with representatives of the United Kingdom.

The president's committee consists of Secretary Harold L. Ickes, acting chairman at last week's conferences; Secretaries Edward R. Stettinius, Jr., permanent chairman, and James Forrestal; Robert P. Patterson, under secretary of war; Leo T. Crowley, foreign economic administrator; Ralph K. Davies, deputy petroleum administrator, and Charles B. Rayner, petroleum adviser to the Department of State.

Ickes' Statement

The following statement was made public by Secretary Ickes:

"An Agreement on petroleum was signed in Washington last August 8 by Secretary of State Stettinius (then Under Secretary) for the United States and by Lord Beaverbrook for the United Kingdom. The document was transmitted to the President, who thereupon submitted it to the Foreign Relations Committee of the Senate, to the end that the Senate might, if it approved, give its consent to ratification.

"Subsequently, spokesmen for the oil industry expressed fear that the wording of the agreement might be construed prejudicially to United States domestic operations.

"Representatives of the Government did not consider that the agreement embraced the dangers which industry spokesmen had believed that they saw therein. They considered that the agreement was a thoroughly sound document, protective of the public interest of both nations, beneficial to the oil industry, and conducive to the fair and orderly conduct of the international petroleum trade. They expressed willingness, nevertheless, to consider suggestions for such revisions as might reassure the industry, provided that the purposes of the agreement were preserved.

"Accepting the Government's invitation, the industry's National Oil Policy Committee, after extensive study and deliberation, agreed upon a body of revisions and these were formally approved by the Petroleum Industry War Council at its meeting of last December 6, and were submitted to me, as Petroleum Administrator for War, for consideration and transmission to the President's committee.

"Although not all of the industry's suggestions were acceptable to the Government, a study of them showed that as to the content of the original document there was no substantial difference upon basic considerations. Government and industry were agreed that the proposed international petroleum commission should be a purely advisory and consultative body; that acceptance of its suggestions should be elective with each government; and that nothing in the agreement should be interpretable as vesting in the federal Government any powers now residing in the states.

"The industry representatives, who participated in the discussions, did so as individuals, since their formal assignment as a committee, with reference to the agreement, was completed when they reported at the December 6 meeting of the Petroleum Industry War Council."

The following industry representatives participated in the discussions: A. Jacobsen, president, Amerada Petroleum Corp., chairman; Orville Harden, vice president, Standard Oil Co. (New Jersey); B. Brewster Jennings, president, Socony-Vacuum Oil Co., Inc.; O. D. Donnell, president, Ohio Oil Co.; John M. Lovejoy, president, Seaboard Oil Co. of Delaware, Inc.; William H. Ferguson, executive vice president, Continental Oil Co.; Russell B. Brown, general counsel, Independent Petroleum Association of America; J. C. Hunter, president, Mid-Continent Oil & Gas Association; George A. Hill, Jr., president, Houston Oil Co. of Texas; A. C. Mattei, president, Honolulu Oil Corp.; J. Frank Drake, president, Gulf Oil Corp.; William R. Boyd, Jr., president, American Petroleum Institute, and chairman, Petroleum Industry War Council; Joseph E. Pogue, vice president, Chase National Bank, and Walter S. Hallanan, president, Plymouth Oil Co.

More Pools to Be Included In Stripper-Well Program

WASHINGTON.—Office of Price Administration plans to add at least 25 new pools to the stripper-well subsidy program, effective February 1. Two will be removed. Three come under the high-cost producer provision. They are (in cents per barrel): Troy (Macatoch and Tokio), Nevada County, Arkansas, at 35; Falls City, Richardson County, Nebraska, at 18; White and Baker, Pecos County, Texas, at 3.

Other changes include: Illinois—White County, East Concord, 35; Marion County, Brown, 20; Coles County, Cooks Mill, 35. Kansas—Ellis County, Haller, 35; Elk County, Colyer, 35. Louisiana—Acadia Parish, Branch, and St. Mary's Parish, Belle Isle, to be deleted. Oklahoma—Muskogee County, Jolly Patton, 35; Beland, 35; Robinson, 35; North Muskogee, 35; Okfuskee County, Dill, 20; Hensley, 35; Osage County, Twin Creek, 35; Naval Reserve, 20; Watkins, 20; Seminole County, Kidd, 35; Northeast Seminole, 20; Wagoner County, Wagoner, 35; Airport, Tulsa, 35; Carter County, McLish, 35; Stephens County, Loco, 20 (a reduction); Oklahoma City (Arbuckle lime), 35. Texas—Coleman County, Gayle, 20.

Water Treating Problems Will Be A.S.M.E. Topic

T. C. Jones, president of the Electro Chemical Engineering Co., Louisville, Ky., will speak in Tulsa February 8 before the Mid-Continent section, American Society of Mechical Engineers, on treatment of water for such applications as boiler feed and in cooling internal combustion engines.

The Mid-Continent sectional meeting March 6 will be held at Stillwater, Okla., at which D. O. Barrett, chief mechanical engineer, Gulf Oil Corp., will speak on "Practical Machinery Design".

Nelson Turner, chief process engineer, Jones & Laughlin Supply Co., Tulsa, addressed the January section meeting at Tulsa last week. His talk was supplemented by a sound film on "Evolution of the Oil Industry."

Mississippi Engineering Committee Establishes Operational Procedure

FUNDAMENTAL operational procedure has been established for the Mississippi Oil and Gas Engineering Committee. The committee currently represents 39 producing, royalty and service companies. Each member company is represented on the committee by at least one appointee and several have designated alternates.

D. V. Carter, Magnolia Petroleum Co., Dallas, is chairman of the committee; L. H. Moore, Gulf Refining Co., Shreveport, is vice chairman; Alec M. Crowell is director, and J. D. Davis, Union Producing Co., Jackson, is chairman of the executive committee. M. E. Norman, committee representative for Buzz Morgan, Jackson, is secretary-treasurer. Work of the Mississippi committee will be similar to that of some 20 engineering committees now functioning throughout the oil country. It will be nonpolitical, will cover all petroleum operations within the state and maintain its own engineering and geological staff. Most other engineering committees confine their activity to one pool or a group of pools closely associated geographically.

Each month the Mississippi committee will assemble factual reservoir engineering data, arrange it in an orderly manner, publish the composite information and distribute the completed work to the members of the committee.

The data for each pool have been defined as follows: Developed area, name of producing formation, number of wells, average porosity, permeability range, average depth, original gas-oil contact, original oil-water contact, gravity of oil, gravity of gas, bottom-hole temperature, average gas-oil ratio, average bottom-hole pressures, current and cumulative production history, all gas-oil ratio and pressure-test data made under direction of the director and any factual data submitted by members of the general committee and approved by the executive committee.

District 3 Restricted Areas Are Announced by PAW

HOUSTON.—Eighteen oil fields in the Southwest are declared restricted areas in an order issued by Henry M. Brown, acting director-in-chief of District 3 Petroleum Administration for War. Authorization is given to use material required to drill not more than five wells in each of the fields so designated, provided each well is at least 3,960 ft. from every other drilling or producible well and all other regulations are complied with. A gas-condensate well cannot be produced except as authorized under Supplementary Order 12 and with permission of PAW.

The new restricted fields follow: South Texas—Albrecht, Los Indios, South Weesatche. Texas Upper Gulf Coast—Brushy Creek, Hope, Nada, New Ulm, Rock Island. North Louisiana—Old Spider, Sicily Island, Tremont. South Louisiana—Big Lake, College Point, East Moss Lake, Laurel Ridge, St. Martinville, South Lake Charles, Starks.

Charles L. Harding Made Director of PAW District 1

NEW YORK.—Charles L. Harding on leave of absence from the legal staff of Socony-Vacuum Oil Co., Inc., last week was appointed director-in-charge of District 1, Petroleum Administration for War. He succeeds J. D. Collins, who died several days ago.

Octane Rating of Civilian Gasoline Receding, Bureau of Mines Reports

WASHINGTON.—The gasoline sold in service stations throughout the United States during the summer of 1944 had lower octane ratings than the gasoline sold in the summer of 1943, according to the semiannual survey of motor gasoline released January 27 by the Bureau of Mines.

Analyses of 894 service station samples, representing products of approximately 90 companies in 21 marketing areas of the nation, disclosed that premium-grade gasoline sold during the summer of 1944 had an average octane number of 75.0, regular-grade gasoline an average of 71.1, and third-grade gasoline, an average of 55.1. The 1943 summer survey showed an average of 79.1 for premium grade, 72.0 for regular grade, and 61.2 for third-grade gasoline.

Inaugurated in 1936, the semiannual motor-gasoline surveys of the bureau are made in cooperation with the Coordinating Fuel Research Committee. The information for the current survey was compiled by O. C. Blade, associate petroleum chemist at the bureau's Bartlesville, Okla., station.

SUMMARY OF THE AVERAGE OCTANE RATINGS OF REGULAR AND PREMIUM-GRADE GASOLINES

	Regular		Premium	
	1944	1943	1944	1943
Boston, Mass., area, including Massachusetts, Connecticut and Rhode Island	71.4	72.7	75.5	79.7
New York area, including New York and Northern New Jersey	71.7	73.1	75.4	78.4
Washington, D. C., area, including Atlantic City, N. J., Maryland and Virginia	71.2	72.6	75.6	79.3
Pittsburgh, Pa., area, including Pennsylvania and Wheeling, W. Va.	71.5	72.0	75.2	79.2
Cleveland, Ohio area, including other cities in Ohio	71.5	71.7	75.5	78.9
Detroit, Mich., area, including other cities in Michigan	70.5	71.6	74.6	78.5
Atlanta, Ga., area, including Alabama, Mississippi, Florida, and South Carolina	71.5	72.7	75.2	79.6
Chicago, Ill., area, including towns in Northern Illinois and Indiana and towns in Southern Wisconsin	70.1	71.6	74.7	79.0
New Orleans, La., area, including Louisiana	71.9	72.9	75.5	79.8
Memphis, Tenn., area, including Tennessee and North Carolina	71.3	72.8	76.3	80.2
St. Louis, Mo., area, including Eastern Missouri, Indianapolis, Ind., and Louisville, Ky.	71.2	71.6	75.0	78.8
Minneapolis, Minn., area, including Minnesota	70.7	72.0	75.1	78.2
Omaha, Nebr., area, including Nebraska, Kansas City, Mo., and Iowa	71.1	71.1	75.3	77.3
Tulsa area, including Oklahoma, Arkansas, Wichita, Kans., and Coffeyville, Kans.	69.9	71.1	75.0	77.8
Texas area, except West Texas	71.0	72.2	74.2	79.3
South Rocky Mountain area, including Arizona, New Mexico and El Paso, Tex.	70.6	...	73.2	...
Middle Rocky Mountain area, including Amarillo, Tex., Denver, Colo., and Salt Lake City, Utah	69.8	69.1	73.7	78.5
North Rocky Mountain area, including Wyoming, Montana, and Spokane, Wash.	70.9	71.2	75.0	78.7
Seattle, Wash.	72.1	73.1	75.0	80.5
Los Angeles, Calif.	71.7	73.0	75.3	80.2
San Francisco Bay region	70.9	72.2	75.7	80.6
National average	71.1	72.0	75.0	79.1

West Edmond Crude Contains Superior Lube-Oil Fractions

Production Expected to Be Better Source for Lubricating Stocks Than Oklahoma City Field

WASHINGTON. — More and perhaps better lubricating stocks than are provided by the well-established Oklahoma City field may come from the 42,000 bbl. of crude oil added to the nation's daily supply by the relatively new West Edmond field, in Oklahoma, Canadian, Logan and Kingfisher counties, Oklahoma. Analyses of the West Edmond crude by the U. S. Bureau of Mines are the basis for this forecast.

In less than 2 years since the completion of the West Edmond discovery more than 300 other producing wells have been completed and 100 additional wells are being drilled. One of the largest concentrations of drilling equipment ever used at one time in Oklahoma was gathered in the new field.

Patterned on a 40-acre spacing plan, the wells are producing from two formations, the Bartlesville sand and the Bois d'Arc section of the Hunton limestone. Most of the well completions have been in the Bois d'Arc section.

Bureau of Mines Hempel analyses of the two crude oils disclosed a striking similarity. Both yielded 31-33 per cent gasoline, 10-11 per cent kerosene, 15-16 per cent gas oil, 19-21 per cent lubricating distillate, and 21 per cent residuum. The Hunton lime sample had about 2 per cent more light gasoline than the Bartlesville sand production, which showed 2 per cent greater lubricating distillate.

In addition to Hempel analysis, the Hunton lime crude was analyzed for its content of 91-octane-number aviation-base stock and under certain distillation processes, about 6 per cent of this crude can be utilized as 91-octane-number aviation-base stock, bureau officials said.

Because the West Edmond field crude oils contain viscous lubricating distillates, the production is expected to be a better source for lubricating stocks than the Wilcox and Arbuckle production from the Oklahoma City field, which does not contain such distillates, according to Bureau of Mines chemists. In addition, the West Edmond crude, which shows a higher A.P.I. gravity than the Oklahoma City field, also has less residuum and a lower carbon residue.

Sun Acquires Exploration Rights in Alberta, Canada

Sun Oil Co., Ltd., of Canada, has taken an exploration contract from the Canadian Pacific Railway covering 517,000 acres of prospective oil land located about 100 miles east of the Turner Valley oil field, Alberta Province, and 12 miles west of the Princess field. Sun Oil Co., Ltd., acquired rights on the acreage prior to exploration. If geophysical work indicates promise of discovery, Sun has the right to turn its exploration contract into leases for oil development and production. This is Sun's first entry into Alberta. However, since 1942 the company has held concessions in Nova Scotia covering 800,000 acres. Exploratory work has been carried on there to fulfill Sun's obligation under the grant, but no wells have been drilled. Sun Oil Co., Ltd., of Canada is a wholly owned subsidiary of Sun Oil Co., of Philadelphia.

DPC Authorizes Increase In Hughes Tool Contract

WASHINGTON. — Defense Plant Corp., subsidiary of Reconstruction Finance Corp., has authorized an increase in its contract with Hughes Tool Co., Houston, to provide additional plant facilities at a cost of approximately $6,000,000, resulting in an over-all commitment of about $17,000,000. Hughes will operate these facilities, title remaining in DPC.

A. G. A. Cancels Meetings Previously Scheduled

NEW YORK.—Nine meetings previously scheduled by American Gas Association have been canceled by the executive board in the interest of the war effort. The meetings canceled follow: Natural gas convention, Cincinnati, May 7-8; spring executive conference, Cincinnati, May 9; technical conference on domestic gas research, Cleveland, February 8-10; West Coast technical conference on domestic gas research, Los Angeles, March 7-9; war conference on industrial and commercial gas, Toledo, March 29-30; accounting conference, Cincinnati, April 10-12; distribution conference, Chicago, April 4-6; conference on public-utility motor-vehicle operation, Chicago, April 4-6; production and chemical conference, New York, June 4-6.

What Others Say:

Three Cost Factors

Ardmore, Okla.

Dear Sirs:

Have read the editorial, "Start From Sound Base," on page 51 of the January 20, 1945, issue of The Oil and Gas Journal, with much interest. Under a free economy prices are normally based on replacement cost. Under a controlled economy it is essential, in the furtherance of the war program, that price ceilings for crude oil be founded, as your editorial points out, on a base of replacement cost of new oil.

The cost of a barrel of oil has, in my opinion, three components, namely: (1) The cost of finding a barrel of oil; (2) the cost of development, and (3) the cost of producing or lifting a barrel of oil. These three items of cost must be added together to get the total cost.

Producing oil from wells at rates in excess of efficient rates, results, as your editorial states, in low per-barrel operating expenditures and temporary profits, but will increase ultimate costs. Probably the determination of costs should be based on production not in excess of efficient rates. I wish that government officials and the public in general could be brought to understand the true basic facts of the subject referred to.

H. B. FELL,
Executive vice president.

Patent Incentives

Philadelphia, Pa.

Dear Sirs:

The editorial anent our patent system in the January 13 issue of The Oil and Gas Journal is timely, able and constructive and deserves commendation. I assume it is no accident that an abstract of Dr. R. E. Wilson's recent article in Mining and Metallurgy appeared on the succeeding page.

What you say is true of all industry but particularly so of the oil industry. No fair person familiar with the technological advances in American industry due in part to the incentives of our patent system will want to tear down the institution that made those advances possible. Present and succeeding generations of Americans will long be indebted to the extraordinary achievements of technologists and scientists before and during the war. But that is not to say that changes in our laws should not be considered where improvements can be made or where evil practices are discovered. Such changes have been recommended by a competent committee and it is to be hoped that they will be incorporated into our laws.

Industry must be eternally vigilant against the Kilgore type of attack and to expose it whenever it gets into position. Your paper can and does do a good job of policing and it does well to sound the alarm when the occasion demands. From that point on it is up to industry to take notice.

Very truly yours,
EMBY KAYE.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

The Next Step

THE revised Anglo-American Petroleum Agreement, now receiving final consideration by the President's committee before being resubmitted to the British representatives and later the United States Senate, places the main responsibility for what is done in petroleum matters squarely upon the operating companies of the two nations. That is where it should be.

It is understood that the pact in its present form incorporates most of those changes agreed upon in December by the Petroleum Industry War Council, with additional minor revisions as a result of the recent conferences between PIWC's National Oil Policy Committee and representatives of the Petroleum Administration for War and the State Department. Our postwar participation is divorced from all governmental controls.

The present pact in its major features carries out the suggestions made a year ago by many of the petroleum industry's leaders for an international oil agreement between the two most important nations of the oil world patterned after the interstate plan in effect since 1935 under the direction of the Interstate Oil Compact Commission. The strength of the interstate compact lies in the fact that it is a voluntary one dependent for its many accomplishments on the good faith of the operators and the participating oil states.

The proposed Anglo-American pact is a bilateral agreement between governments whose nationals, not including the U.S.S.R., produce all but a small per cent of the world's oil. The agreement provides for the machinery of administration and for final "advisory" and "consultative" approval by the governments. Effectiveness of any proposal is entirely dependent on the voluntary acts of American and British oil operators. In actual practice, as in the case of the interstate activities, operators themselves who are more familiar than anyone else with petroleum problems would initiate many of the petroleum measures.

If the operating companies are to be held accountable for effecting a sound petroleum program, with its dominant part in future world economic and social trends, it follows that they must have freedom of action to do whatever has to be done. In this country that freedom includes certain guarantees from the federal Government involving the antitrust laws.

The international pact is based on cooperative action involving both domestic and foreign operations. That means possible conflicts with our many-headed antitrust interpretations.

It will not be sufficient that the President or his current attorney general promises immunity to operators in effectuating government requests. The oil business can still recall the NRA days and the Madison trial. Furthermore, this planning must extend into a future which cannot be predicated on the promises of one administration.

So far as this country is concerned, antitrust protection for operators must either be part of the pact approved as a treaty or it must be supported by the required legislative acts. The domestic oil industry wants no guarantees other than those required to fulfill this international program, but those it must have.

An official statement explaining just what the procedure will be in establishing this basic government-industry relationship is the next necessary step in rounding out the Anglo-American agreement for final approval.

Use of LPG as Chemical Raw Material on Upswing

by Paul K. Thompson*

THE GROWING trend of LPG as a chemical raw material is shown in Chart 1. The major components, presently employed for chemical use, are propane and butane-butylene mixtures. This study indicates that a total of 110,895,000 gal. of LPG, as a liquid, was used as a chemical raw material in 1943. The 1944 requirement is set at 159,788,000 gal., an increase of 44 per cent. It should be noted that these volumes are for that LPG shipped as a liquid only. Larger amounts of these gases are delivered to chemical plants in the gaseous form by pipe lines. A recent estimate of the quantity of LPG used as a chemical raw material, delivered as liquid or gas in the United States, indicates that a total of 389,127,500-gal. equivalent was used in 1943. The 1944 requirement was set at a 478,022,000-gal., an increase of 23 per cent. This chemical use of LPG continues to grow with prediction of ever increasing amounts of ethane-propane and propane-butane mixtures as raw material in processes employing regenerative cracking and catalytic oxidation, respectively.

In the production of newer, better and greater quantities of aviation fuel and to continue to meet essential military and civilian requirements of various fuels and other petroleum products, large quantities of

*Chief, Liquefied Petroleum Gas Section, Natural Gas and Natural Gasoline Division, Petroleum Administration for War.

This slightly condensed report on utilization of LPG as a raw material in production of chemicals and other synthetic products is based on a study made by an industry subcommittee headed by G. R. Benz, Phillips Petroleum Co., Bartlesville. The study did not cover District 5. While data for the last 9 months of 1944 are shown as estimates, the committee made revisions in all basic information up to a recent date and the basic figures, therefore, are essentially current.

LPG are being used in refinery operations. In reporting the growing trend of LPG for refinery uses (Chart 2) security restrictions have necessitated that this classification include not only conventional refining demands but those for isobutane for alkylation and butane for isomerization purposes. This is necessary to eliminate any possible prediction relating to increased alkylate production. Nevertheless, the increased use of LPG for total refinery uses reflects their growing importance in the production of aviation-fuel components. In 1943, 1,558,209,000 gal. of LPG were used for refinery operations and 2,327,208,000 gal. estimated in 1944. This increase of 768,999,000 gal. (about 50 per cent) is of interest when compared with the total sales of LPG in the United States for 1943 of 675,233,000 gal. as reported by the United States Bureau of Mines. This large use of LPG in refinery operations can be expected until total victory. The termination of the war in Europe should not bring any reduction in the manufacture of key aviation-fuel components such as isooctane alkylate, even though the total production of finished aviation fuel may be temporarily reduced until the concentration of the total war effort is established in the Pacific area.

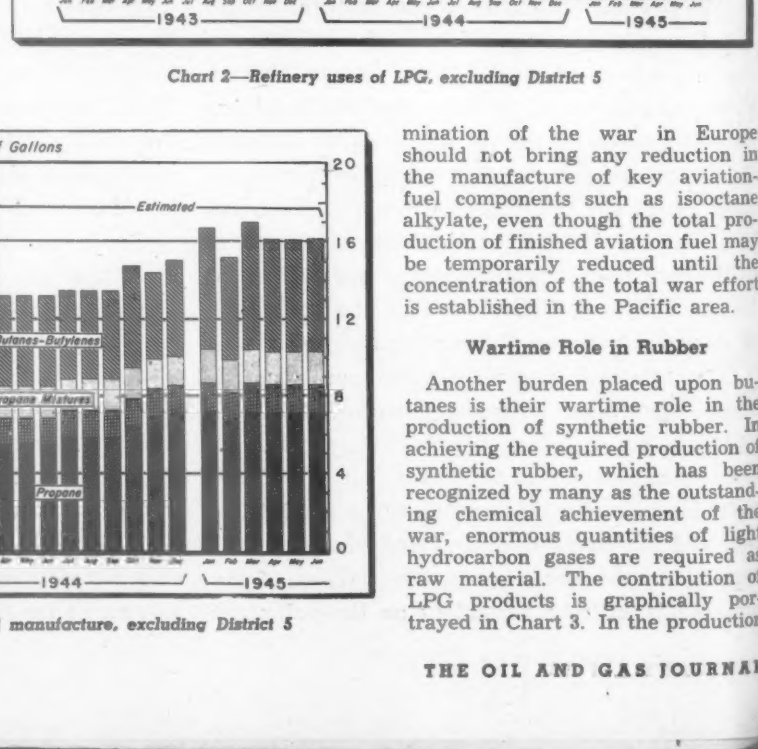


Chart 2—Refinery uses of LPG, excluding District 5

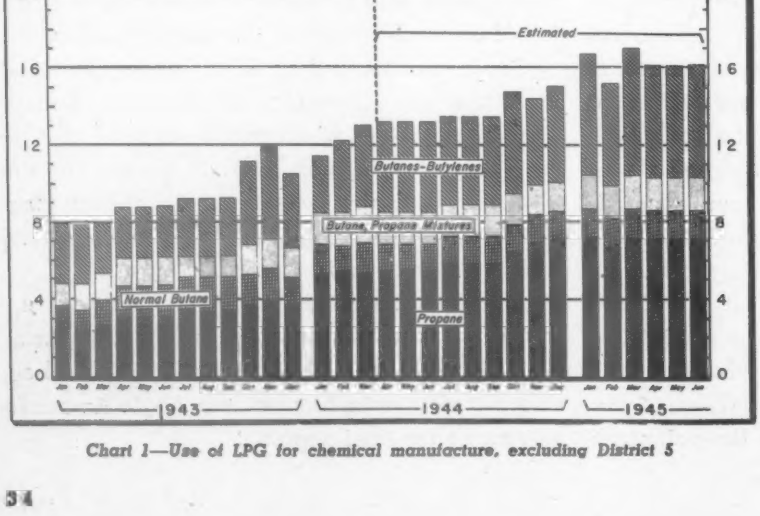


Chart 1—Use of LPG for chemical manufacture, excluding District 5

Wartime Role in Rubber

Another burden placed upon butanes is their wartime role in the production of synthetic rubber. In achieving the required production of synthetic rubber, which has been recognized by many as the outstanding chemical achievement of the war, enormous quantities of light hydrocarbon gases are required as raw material. The contribution of LPG products is graphically portrayed in Chart 3. In the production

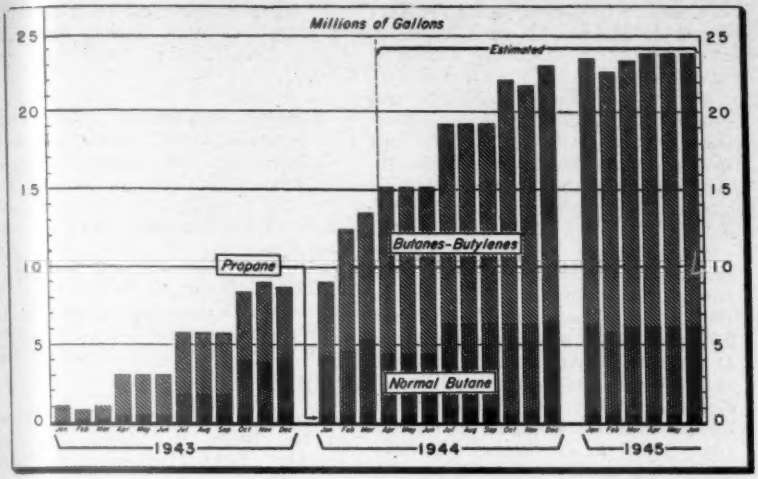


Chart 3—Use of LPG for synthetic-rubber components, excluding District 5

of butadiene, one of the chief ingredients of synthetic rubber, large quantities of butane-butene mixtures are required. Thus, as in the case of isooctane alkylate, the production of synthetic rubber imposes large demands upon butanes. The survey reveals that 55,434,000 gal. of LPG were required for synthetic-rubber production in 1943 and 205,457,000 estimated in 1944, an increase of 270 per cent. Again, the future demands for LPG products for synthetic-rubber components are similar to those previously mentioned in the production of aviation fuel in that no reduction in their use can be expected until total victory in Europe and the Pacific. Even with total victory, the nation's synthetic-rubber plants may be expected to continue maximum production to fill backlogs of civilian requirements in addition to replacing large amounts of imported natural rubber until such time as natural rubber sources are once more revived and productive.

It is interesting to note that the survey clearly indicated a swing of significant magnitude to the predominance of propane over butane-propane mixtures for fuel uses. This abnormal relationship results, of course, from the temporary diversion of large quantities of butanes to war products. The fuel use of normal butane and spent refinery butanes throughout the period studied, continues to bear the same relationship to the use of propane and butane-propane mixtures, as in the past. The use of propane as fuel appears to have experienced the greatest increase of all LPG fuels, mainly because of the diversion of butanes. Accompanying this increase are the conventional moderate seasonal fluctuations. The widespread use of butane-propane mixtures as heating fuels results in more pronounced seasonal demands than are evident in the use of any other LPG product. The moderate increase in the use of LPG products for fuel, other than butane-propane mixtures and the slight increase in the use of the latter, clearly reflect the results of the necessary steps taken by government and industry to insure the availability of these components for use in the production of vital war materials.

The well-known fact that ample propane exists at production sources was indicated by the survey. As previously pointed out, the survey did not report factually on the very serious distribution phases. The lack of distribution facilities precludes the classification of this potential supply as available supply for actual consumer demands.

Value of Report

Although the entire report cannot be released at this time for war security reasons, it is hoped that industry will recognize the efforts of the committee and the value of the report submitted. The interest of industry in such surveys is timely, and it would seem to be appropriate for a continuation of these studies by industry on the return to normal times when war agency requests for such work will not be forthcoming. In anticipation of present LPG problems continuing throughout the year of 1945 the Petroleum Administration for War has requested the special LPG survey subcommittee to continue the study for an additional period. It is contemplated to expand the proposed study to include PAW District 5 (West Coast) thus making the survey nation wide.

As indicated by the preliminary report of the committee and substantiated by the final report, there was a shortage amounting to 4 to 7 million gallons per month of butane for all uses. This shortage was immediately felt by the LPG industry. With the cooperation of the Refining Division of PAW, the necessary steps to alleviate this condition were taken to divert certain streams of mixed butanes from refinery use to LPG fuel markets.

Basis of Current Shortage

The present shortage of LPG products, the result of wartime demands, is a widely discussed subject. These discussions are not, in general, restricted to present conditions but in many cases predictions have been voiced that these shortages will continue even after the return to normal times. Some visualize a propane shortage; others predict continued difficulty in obtaining the desired amounts of butane. The discussion herein relating to LPG operations, on the return to normal times, is based upon an analysis of the survey committee's report, viewed in light of related information gathered in this division. The trend observed suggested that with the return to normal times, there will be a marked decrease in the demand for LPG products which are now required for wartime fuels and raw materials. Accompanying that decrease will be an increase in use as conventional LPG fuel, including the possible development and production of new fuels and for chemical manufacture. Thus, an ever-expanding LPG industry appears to be assured. There should be ample supplies of propane and butanes to be used as economic conditions dictate, with increased supplies as needed, made possible by the availability of equipment for their production, transportation, storage and utilization. As increased demands for LPG products come about, production should keep pace with or possibly exceed market demands. Increased discoveries of natural gas and gas-condensate fields and the development of cat cracking operations, together with modern extraction and separation procedures, apparently assure the availability of increasing amounts of light hydrocarbon fractions for LPG products. In addition, these developments suggest production of sizable amounts of LPG in locations where hereto-

Index Ready Soon

The complete editorial index of The Oil and Gas Journal for 1944 will be ready soon, but, conforming to practice in previous war years, it will not be published in a regular issue. The 1944 index, bound separately, will be sent without charge to all subscribers requesting a copy. Address requests to Circulation Department, P. O. Box 1260, Tulsa.

fore a long haul by tank car was necessary.

Diversified opinions have been voiced regarding the magnitude of demands which may be made of LPG in its capacity as a chemical raw material on the return to normal times. Based upon present operations, which find butane-butene and isobutane as the key components for present chemical manufacture, when synthetic rubber and aviation fuel are included, there is a tendency to predict that butanes will be in such demand that a general shift to the lighter product propane will be necessary for the expansion of the LPG fuel industry. Rapidly changing conditions suggest that this supposition may not be entirely correct. In fact, some predict just the opposite; i.e., propane will be the key component for chemical manufacture and not butane. In analyzing this situation, it must be pointed out that with the return to normal times the large quantities of butanes presently going into war material can be made available for peacetime uses. Too, we are now passing from an era of moderate thermal cracking into one in which intensified catalytic operations will predominate. Thus, where butane has been necessary to produce propylene in moderate thermal cracking, catalytic dehydrogenation will permit the use of propane as charging stock when the perfection of a satisfactory separation process is developed. In general, the present trend suggests that acetylene, ethylene and propylene will be the major components in tomorrow's chemical synthesis. The perfection of processes presently under investigation indicates the use of ethane and propane in ever increasing quantities as raw materials for the production of these chemical components. Naturally, butane will be required as a raw material in many chemical operations, but this demand may not be as exhaustive as predicted by some. Therefore, the return to normal times should see a balanced demand for LPG products, allowing this industry to expand and progress in a reasonably stable and desirable fashion.

Military Gasoline Stocks Compared With Civilian

NEW YORK.—Gasoline stocks in the United States, as reported by American Petroleum Institute for the week ended January 20, totaled 88,708,000 bbl., of which 42,926,000 was classified as "military and other," and 45,782,000 as "civilian" grade. This is the first time that such a comparison has been made available.

A week earlier the stock total was 87,814,000 bbl., of which 42,724,000 was military grade and 45,090,000 civilian. In the week ended January 22, 1944, total stocks were 79,444,000 bbl., including 35,983,000 for military use, and 43,461,000 for civilians.

The A.P.I. reports "military and other" grades of gasoline as including "aviation, military, solvents and naphthas, and gasoline stocks currently indeterminate as to ultimate use, and 12,062,000 bbl. of unfinished gasoline."

Breakdown of civilian-grade gasoline stocks by districts follows, with change from January 13 (figures in thousands of barrels): East Coast 5,975, up 193; Appalachian (District 1) 1,286, up 55; Appalachian (District 2) 1,085, off 247; Indiana-Illinois-Kentucky 13,991, off 47; Oklahoma-Kansas-Missouri 6,662, up 24; Inland Texas 1,695, off 47; Texas Gulf 5,265, off 48; Louisiana Gulf 1,870, up 146; North Louisiana and Arkansas 1,867, up 305; Rocky Mountain (District 3) 66, up 8; Rocky Mountain (District 4) 1,164, up 70; California 4,856, up 280.

A.I.M.E.'s Annual Meeting Canceled by Directors

NEW YORK. — Conforming with the request recently published by James F. Byrnes, director of war mobilization and reconversion, the directors of American Institute of Mining and Metallurgical Engineers have canceled the institute's general meeting scheduled for February 19-22 in this city.

"Although we feel that abandonment of the meeting will be a detriment to prosecution of the war, this is overshadowed by the need for conserving transportation facilities," said Chester A. Fulton, president. He added that the more than 300 technical papers to have been presented at the meeting would be made available as rapidly as possible to the 12,500 members by means of the various publications of the institute.

DEATHS

Felix M. Miles, 59, for the past 18 years oil operator in the Owensboro, Ky., field, died in that city January 20.

Kenneth W. Davis, 47, in charge of the mixing plant of Pennsylvania Gas Co. at Warren, Pa., died January 14. He was a veteran of World War I.

O. A. Kemnitz, drilling contractor of Oklahoma City, was burned to death on a rig near Powell, Wyo.

R. S. Dodd, 65, oil operator, of Houston, died January 26.

Newton S. Wilson, 80, at the time of his retirement manager of the old Midwest Refining Co.'s field operations in the Rocky Mountain area, died January 25 in Los Angeles.

James L. Greene, 47, independent oil operator, died January 22 in Midland, Tex. He started in the oil business with the old Roxana Petroleum Corp., and was a former president of Permian Basin Oil Association.

Delford U. Arird, 94, oil operator and for two terms president judge of Warren and Forest County courts, in Pennsylvania, died January 17 in Warren.

James A. Smith, 68, oil producer in the Bully Hill field, Venango County, Pennsylvania, died January 21.

Harry B. Troutman, 72, former oil and gas operator in Oklahoma, died recently in Woodsfield, Ohio, where he had resided several years.

Parker L. Melvin, 49, oil operator and former president of Pennsylvania Grade Crude Oil Association, died of a heart attack at his home in Bradford, Pa., January 24. He was president of Towne-Melvin Oil Co. and a partner in Matson, Towne & Melvin Co. He was the official representative of Pennsylvania in Interstate Oil Compact Commission. He had served as president of Bradford District Oil Producers Association.

M. M. Munson, 77, well driller for Ohio Leather Co., died January 3 in Girard, Ohio.

Lt. Comdr. Hale B. Soyster, 45, chief of the conservation branch, U.S. Geological Survey, Washington, on assignment to the Navy as assistant director of the Naval Petroleum Reserves Division, died January 24 in the Naval Hospital at Bethesda, Md., following an illness of 3 months. He had been connected with the survey for years in the field and in Washington. He graduated at University of California with an A.B. in geology in 1922.

M. H. McClellan, 44, geological engineer, died January 25 in Shawnee, Okla. McClellan was employed by Gulf Oil Corp. in South America for several years before going to Shawnee to reside in 1927. He was an independent operator in the East Texas field in the early thirties.

Robert F. Carr, 73, Lake Forest, Ill., chairman of Dearborn Chemical Co. and former president of the University of Illinois board of trustees, died following an illness of 3 weeks.

Finley S. Gates, 82, retired oil producer, of Oil City, Pa., died January 25.

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Application of Contact Filtration in Refining High-Quality Lubricating Oils

by P. L. Paull and I. A. Schwint

THE APPLICATION of modern refinery methods and equipment to the principles of contact filtration is exemplified in the operation of the clay contact plant at The British American Oil Co., Ltd., Clarkson, Ont. Of the numerous contact filter plants in operation in various refineries over the United States and Canada few have the advantage of full modernization which results in unusual flexibility combined with definite economies in labor and material.

British American's new 8,750-bbl.-per-operating-day refinery at Clarkson applies the latest petroleum processes and equipment to the refining of aviation and motor oils from Mid-Continent and Illinois crudes. Lube-oil fractions are separated by vacuum distillation which yields four side streams ranging from light-motor to heavy-aviation-base stocks. These are separately refined by furfural extraction M.E.K.-benzol dewaxing and finally by contact filtration with an activated clay.

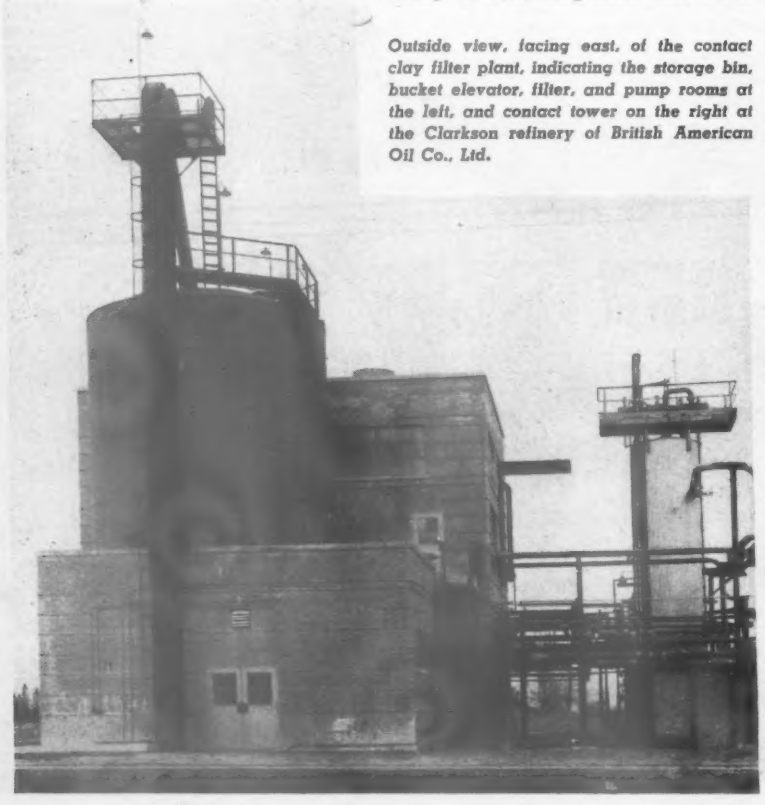
Certain features of the process both with respect to design and performance are of especial interest. These are continuous operation, flexibility in switching from one stock to another, low over-all process losses, and low labor cost wherein two men per shift are required to operate a 1,000-bbl.-per-day unit. The plant has flexibility with respect to time and temperature of contact, making it possible to process each stock at those conditions which are optimum for clay economy. It is felt that such flexibility is of particular assistance in meeting new product specifications and shipping schedules which may change with little notice. All these make it extremely economical and easy to run the plant. This article describes the equipment and operation of this British American oil plant for processing motor and aviation lubricating oils.

P. L. PAULL

I. A. SCHWINT

P. L. Paull began his oil-industry career in 1935, upon graduation from Yale with a bachelor of science degree in chemical engineering. He commenced work with a major company in the Wood River, Ill., area, and was assigned to lubricating-oil manufacture for 8 years. He left to take charge of lubricating-oil manufacture at the new Clarkson refinery of British American, where he is refinery manager in charge of operation.

I. A. Schwint majored in chemistry, mathematics, and physics at Southwestern College in Winfield, Kans., graduating with a B. A. degree in 1939. In that year he joined the sales department of Filtrol Corp., where he is a field engineer in the petroleum division.



Outside view, facing east, of the contact clay filter plant, indicating the storage bin, bucket elevator, filter, and pump rooms at the left, and contact tower on the right at the Clarkson refinery of British American Oil Co., Ltd.

Description of Equipment

The basic equipment required for contacting with activated clay consists of a mix tank, heater, contact and stripping tower, and filtering equipment to separate the clay from the oil. The accompanying general flow diagram shows the relationship of these items together with additional equipment such as heat exchangers, pumps, coolers, etc.

The clay-mixing equipment is a cylindrical cone-bottom tank, 5 ft. in diameter and 10 ft. high, with a mechanically operated stirrer. Activated clay and oil is fed continuously into the top of the vessel and the slurry is continuously pumped out the bottom.

A Lummus heater is used for heating the clay-oil slurry to contact temperature. This is a radiant-type, series flow pipe heater in which the

tubes are 2½" o.d. by 2" i.d. Total heating surface is approximately 250 sq. ft. and the heater is designed to handle 1,000 bbl. of oil plus 25,000 lb. of clay each operating day.

The contact tower is an insulated tank 6 ft. in diameter and 20 ft. high and is designed to operate with vacuum steam stripping. Baffle plates are installed to obtain distribution of incoming flow and to prevent entrainment of oil with the steam and volatile hydrocarbons being removed overhead.

Filtration

Spent clay is separated from the contact oil in an enclosed Oliver precoat filter. The drum is 5 ft. 3 in. in diameter and 8 ft. long, and its surface is covered with a fine-mesh stainless-steel wire screen which previous to the filtering operation is coated with diatomaceous earth. To precoat the filter requires about 1½ hours exclusive of time required for heating the precoat oil to the desired temperature. For this operation an oil of light viscosity is circulated through a heater and the filter system until the precoating temperature of 300°F. is reached. This stream then flows through an eductor where diatomaceous earth (filter aid) is added to the oil to form a slurry of approximately 2 per cent filter aid and 98 per cent oil. Vacuum is applied to the inner piping system of the filter drum and the diatomaceous earth is picked up on the surface as the drum revolves through the slurry in the lower half of the filter shell. Addition of diatomaceous earth to the oil through the eductor is continued until a precoat of approximately 2½ in. builds up evenly across the surface of the drum.

The filter is then ready for operation and the clay-oil slurry from the contact tower is pumped into the filter to be continuously picked up by vacuum; the spent contact clay is deposited on the surface of the precoat and the oil flows out of the drum to the filtrate receiver. As the drum revolves, a knife blade moves against the precoat cutting off a few thousandths of an inch with each revolution together with the clay which has been filtered out during that revolution. Clay cake and small amounts of precoat drop from the knife blade to a scroll which moves the spent clay from each end of the filter and discharges through an opening in the center of the filter shell. Another scroll transfers the spent clay to a storage bin. Normal operation usually calls for cutting the precoat continuously; however, it was found that the capacity of the Oliver filter was sufficient to permit cutting the precoat intermittently, thereby increasing the life of the precoat from 4 days to as long as 3 weeks.

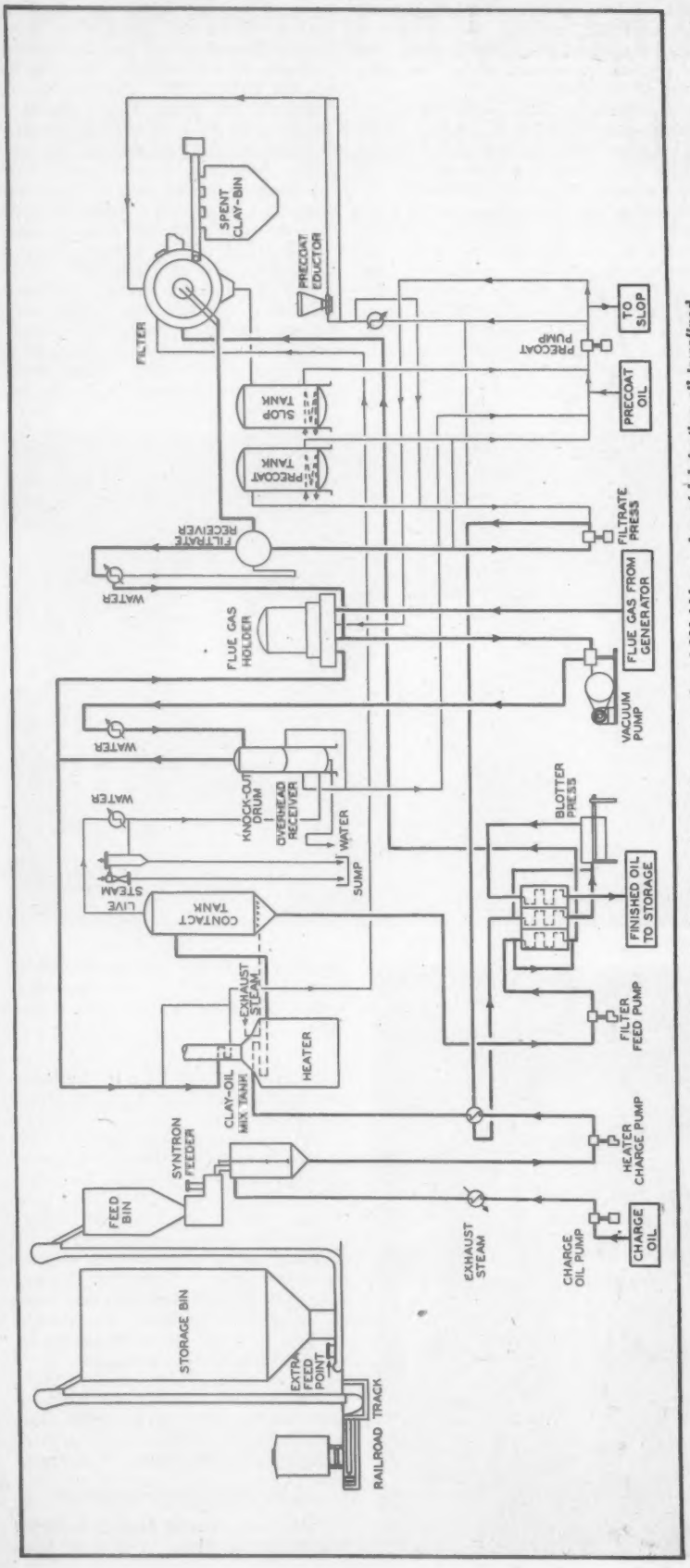
Hot flue gas from an inert-gas generator blankets the filter shell during operation to prevent oxidation and to reduce fire hazards at the time of filtration. Inert gases are stored in a holder which absorbs fluctuations of pressure in the inert-gas system of the plant and, working in conjunction with a vacuum pump, maintains a constant pressure equivalent to several inches of water on the filter shell. The incoming flue gases to the filter first pass through a section of the direct-fired heater where they are heated to filtration temperatures. The vacuum pump circulates the flue gas through the filter, filtrate receiver, and heater. Volatile light ends and entrained oil are removed from the gases by condensation and collected in a knockout drum from which they are pumped to a storage tank. A seal on the filter end of the flue-gas system is maintained by positively sealing the spent clay scroll.

Above: Filter room of the contact clay filter plant showing on the left the Syntron feeder, and on the right the Oliver vacuum filter

Below: Slurry mix tank and centrifugal pumps of the contact clay filter plant

Clay-Handling Equipment

Bulk super filtrol clay is shipped to British American in covered hop-



Flow chart of contact filtration units at the Clarkson plant, where more than 1,000 bbl. per day of lubricating oil is refined

per cars and delivered on a rail siding which is only a few feet from the contact plant. The fine-mesh clay flows by gravity through bottom openings in the hopper car to a motor-driven scroll. The unloading scroll and bucket elevator are of dust-tight construction to eliminate this usual annoying feature in handling fine mesh clays. Clay is discharged from the bucket elevator into the top of the bulk-clay storage bin. This storage bin is a cylindrical steel tank, 22 ft. in diameter which will hold approximately 200 tons, or enough material for about 36 days of average operation on the basis of design clay requirements. However, it has been found through operation that this storage is sufficient for 2-month supply due to reduced clay dosages. A conveyor moves the clay from the main storage bin to a secondary feed storage bin, where it gravitates to the Syntron weigh feeder. The 10-ton capacity of the latter bin is sufficient for 12 to 16 hours' operation at maximum throughput and clay dosage.

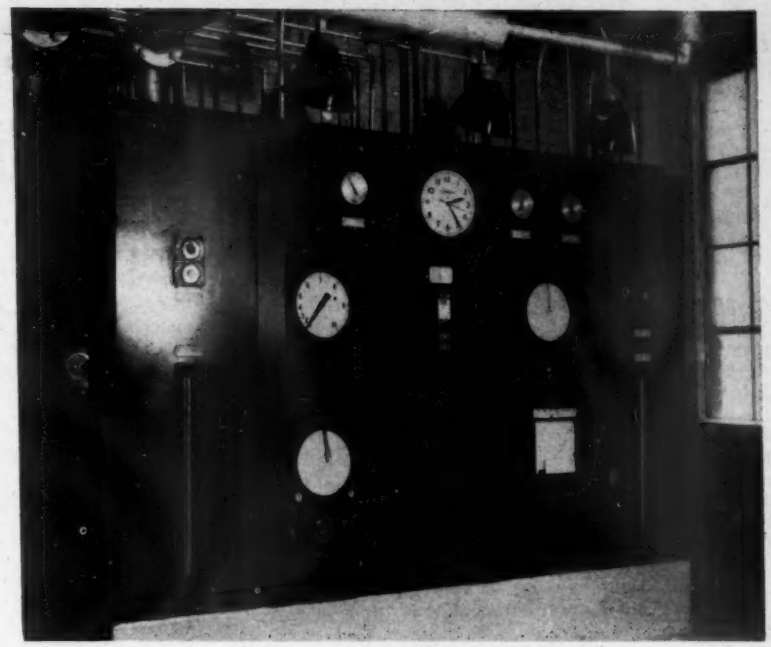
The Syntron feeder discharges clay into the mixing tank from an endless belt which is suspended on a balance. The endless belt is supplied with clay from a Vibratory feeder which is controlled by means of electrical contacts on the balance. These electrical contacts change the rate of the Vibratory feeder in the proper direction to correct any variation from a constant weight of material on the belt. They also automatically set the hopper opening to correspond to the proper rate of feed. Changes in the clay feed rate are made simply by adjusting a rider on the balance beam. All the mechanism for proportioning and feeding the clay is enclosed in a dust-tight compartment and discharges into the mix tank which has a dust-tight covering. A coarse ⅜-in. mesh wire screen is in position between the belt discharge and the clay oil mix-tank to obtain equal distribution of the clay dropping to the surface of the oil and to remove any foreign material.

Description of Operation

Charge oil at the rate of 1,000 to 1,500 bbl. per day is pumped from storage to the clay contact plant where the entire stream flows to the mix tank into which Filtrol clay is fed at a predetermined clay-oil ratio by means of the automatic clay-weighing-and-feeding machine. The clay and oil are thoroughly mixed at a temperature of 180°F. with a mixer which turns at 450 r.p.m. Slurry is continuously pumped from the mix tank by a centrifugal pump through an exchanger where it picks up heat from hot filtered oil before entering the inlet of the heater. Maximum heater outlet temperature on

the heaviest stock to date (Aviation 120) has been 520°F. although heater design allows for higher outlet temperature if desired. From the heater the hot slurry flows to the vacuum contact tower in which, at normal operating level, 45 minutes contact time is obtained when the flow is 40 bbl. per hour. The contact time can be regulated by increasing or decreasing the oil flow through the plant. In the vacuum tower the oil is stripped with steam to remove volatile impurities, improve the emulsion characteristics and to insure a color stable and odor free product. The steam also provides agitation to keep the clay particles suspended in the oil during the contact period. A centrifugal pump removes the slurry from the bottom of the contact tower and transfers it to the continuous vacuum precoat filter where the clay is removed from the oil. On the lighter stocks the oils are filtered at contact temperature but on heavier stocks the slurry passes through a cooler before going to the filter.

Separation of the clay from the oils is accomplished efficiently with the spent cake containing only 1 to 2 per cent of the oil charged. It is continuously removed from the filter by a screw conveyor to a storage bin. The spent-clay storage bin is high enough off the ground level that its contents can be discharged into a dump truck for disposal.

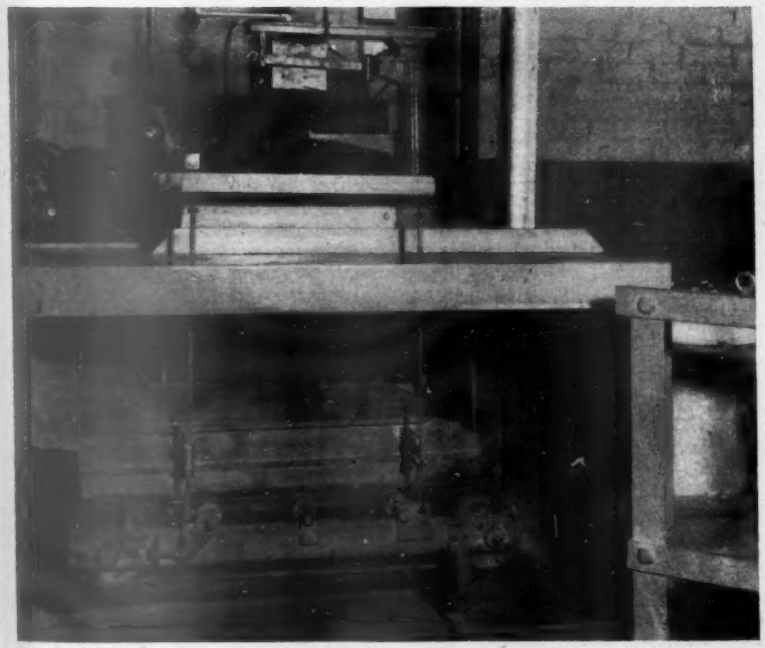


Control panel of the contact clay filter plant

TABLE I

Stocks—	S.A.E. No.	Chg. Stk. N.P.A. Color	Flash (°F.)	Lb. Filtrol per bbl.	Contact Temp. (°F.)	Filt. Oil N.P.A. Color	Flash (°F.)	Carb. Res. dec. on Filtration
A-70	10	3	410	4½	285	2	415	....
A-95	10	2	410	4	330	1½	415	....
B-70	30	5½	480	10	400	2	485	....
B-90	30	3½	490	8	385	2	490	0.26
C-95	50	3½	530	11	440	2	535	....
D-96	70	8	590	20	495	4½	595	.06

(Letter refers to vacuum distillate cut; number to finished viscosity index. Example: A-70 is No. 1 distillate cut finished to 70 V.I.)



Cutaway view of the Syntron feeder

Oil flows from the filter to the filtrate receiver, then passes through an exchanger where its heat is applied to the stream entering the heater. Secondary filtration through a blotter press is the final operation to make certain that no clay fines or other impurities remain in the finished oil which is then pumped through a final cooler to a rundown tank.

Four 350-bbl. rundown tanks with a total capacity approximating 24 hours' maximum operation allows sufficient time for complete inspection tests before pumping the finished lube stock to storage.

Table I shows typical operating conditions which have produced satisfactory results on base stocks processed to finished lube up to the present time.

William S. Cochran, Tulsa, has been retired following 20 years' service as attorney for Sinclair Prairie Oil Co. and its affiliates.

E. J. Deupree, formerly district superintendent for The California Co. in central Louisiana and Mississippi, with headquarters at Ferriday, La., has been promoted to general superintendent of the southern division, with headquarters in New Orleans.

Examples of Fitting Production Program To Pool Conditions in Illinois Basin

by Kenneth B. Barnes

THIS article will deal with the character, producing conditions, general behavior, and oil recovery to date for four oil reservoirs in the Illinois basin. Of unusual interest is the fact that for each of the reservoirs, one operator by reason of the location and extent of his leases, was able to conduct development and production programs in respect to his holdings which were tailored to fit reservoir conditions specific to the particular pool. The aim was the obtainment of high ultimate recovery. A wealth of production data, pressures, samples, tests, and the like have been collected in the work.

The four reservoirs to be discussed are by no means isolated examples of such "fitting" and "tailoring" of development and production practices to best accord with specific subsurface conditions. Still, in general, a large part of the oil production in Illinois during the last few years has been at withdrawal rates which at practically all times has equaled or closely approached maximum capacity, regardless of what the particular conditions, reservoir character, and producing mechanism may have been. For reservoir conditions most common in the Illinois basin area, such capacity or near-capacity operations has made many of the pools produce by virtue of dissolved-gas mechanism. A chief characteristic of this mechanism, unfortunately, is the low ultimate recovery that is obtained.

Types of Producing Mechanisms

The petroleum-engineering field in recent years has given particular study and stress to the different basic oil-production mechanisms, which are: (1) dissolved-gas drive; (2) gas-cap drive; (3) water drive. Besides these, sometimes gravitational forces may supplement the basic mechanisms in important measure, and under certain conditions be a major factor in itself.

The characteristics, behavior, and relative oil-recovery ability of the three production mechanisms have been presented and discussed in detail[1,2,3]. For each mechanism, the criteria of reservoir pressure, gas-oil ratio, water production, behavior of wells, and other factors have been shown to have distinctive trends and relationships. By this time it is believed there is rather wide agreement that the dissolved-gas drive is usually much less efficient than the gas-cap-drive and water-drive mechanisms.

One type of illustration which quickly summarizes the three production processes is shown in Fig. 1. In the upper portion of the diagram, under "A— Dissolved Gas Drive", the constant increase of gas in total pore volume is depicted as depletion takes place. As the gas expands, the driving force or energy is consumed. The liquid-oil phase shrinks, and the relative permeability or ability of the oil to flow becomes less and less. The reservoir pressure drops rapidly.

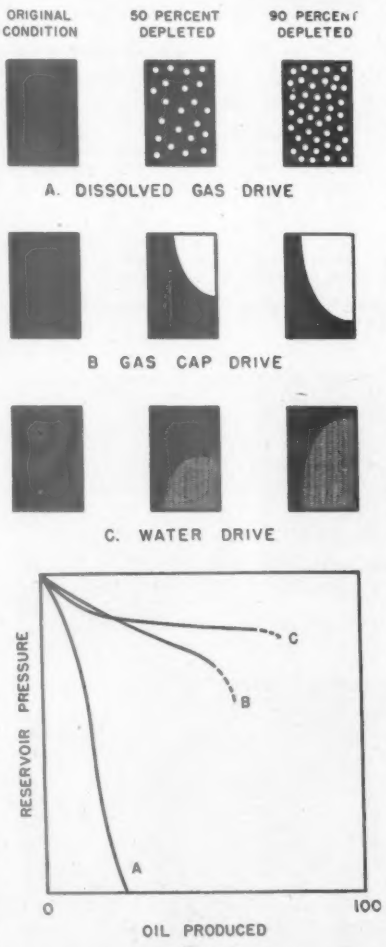


Fig. 1: (Upper)—Oil-zone depletion under different drives. (Lower)—Reservoir-pressure variations under different drives. (From Buckley and Craze, The Oil and Gas Journal, May 13, 1944)

In "B— Gas-Cap Drive", the reservoir pressure does not fall as rapidly and the oil does not shrink as much. Naturally, the exact course followed will depend upon the different items making up the given pool and the production practices followed. The ideal, however, is to keep the dissolved gas in solution in the oil phase so that a high oil saturation and high relative permeability to oil flow is maintained. Injection of produced gas back to the gas cap portion of the reservoir (white space in diagram "B"), or pressure maintenance work, is the artificial means of maintaining the preceding desirable factors at maximum level.

Water-Drive Factors

The mechanics for the water-drive process, "C" in Fig. 1, in part also are similar. It again can be desirable to keep reservoir pressures sufficiently high to maintain 100 per cent oil saturation in the unflooded formation, so the oil flow there remains at maximum amount, unaffected by freed gas bubbles and increasing gas saturation.

The point to the four examples to be given here, then, really is that preliminary engineering studies of the properties showed that if all production were to be taken at maximum capacity, they would have responded as dissolved-gas or "expansion" reservoirs, with resultant low recovery. Instead, in each case, and according to specific pool conditions, the principal operator handled his properties so as to cause them to produce by one of the more efficient mechanisms.

One further phase relates to the classification of producing mechanisms. There is, to some degree, a range of efficiency for each. For example, a water drive can follow a fairly uniform front or it can be accompanied with fingering and coning which reduce the recovery. From the standpoint of practical operation, therefore, it may be as important to have a highly efficient gas or water-drive-production operation as, in the first place, to have production by one of those mechanisms.

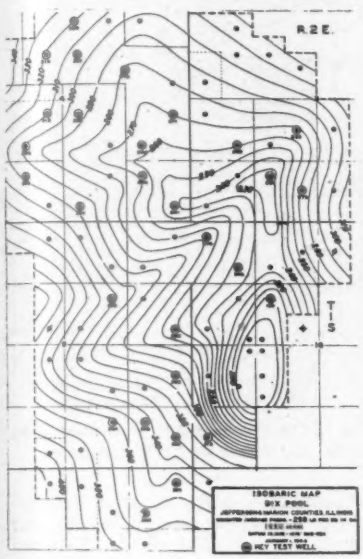
1—Dix Pool—Benoist (Bethel) Sand

A—Pool Data and Producing Conditions

Location is in Jefferson and Marion counties, a few miles south of the Louden pool. Productive formation is Benoist (Bethel) sand of the Chester series of the Mississippian, with depth of 1,950 ft. There are 1,550 productive acres. Structure is an oval dome with 30-ft. closure. Lower part of total sand thickness of 25 ft. is water bearing, and well penetrations were made in the upper 12 to 15 ft. The sand is continuous and water bearing outward from the pool for several miles in all directions.

Majority of pool was developed on 20-acre spacing; 10-acre spacing was used by some operators in a small portion of the southeastern acreage.

Average permeability of productive formation is 100 md., porosity is 14 per cent. Reservoir pressure was 735 p.s.i. at date of discovery in December 1937. Reservoir crude oil was found to be undersaturated, containing 115 cu. ft. per bbl. at saturation (bubble point) pressure of 270 p.s.i. The corresponding viscosity was 2.5 centipoises.



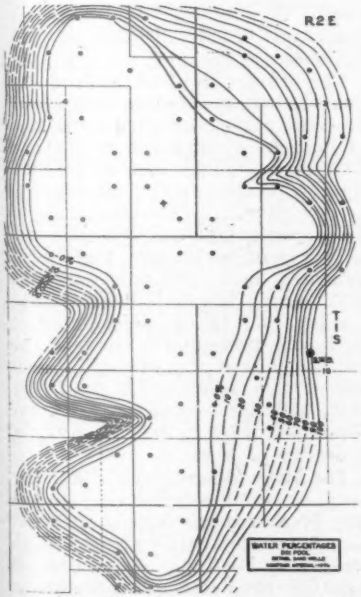
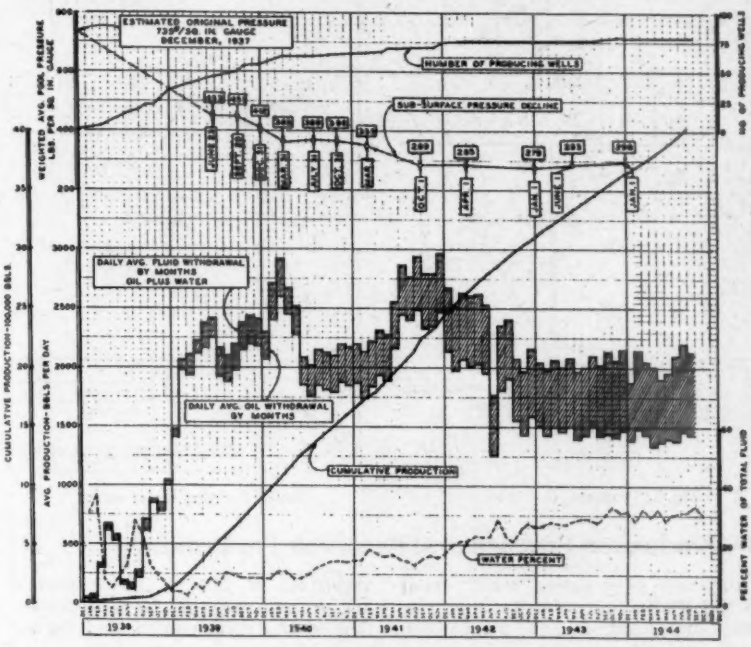


Fig. 2: (Upper left) Isobaric map. Fig. 3: (Above) Water-percentage map as of September 30, 1941. Fig. 4: (Upper right) Chart of complete production data and pressures



B—Production Practice and Reservoir Performance

Early in the life of the pool, presence of an active water drive was indicated.

The first pressure period showed decline of 282 p.s.i. Per well withdrawal was reduced, with total rate being lowered from 2,400 to 2,150 surface barrels daily. The bottom-hole pressure in succeeding 3 months declined only 2 p.s.i.

Additional drilling and water production soon followed, however, and total withdrawals increased. Further declines in pressure ensued, so in June 1940, withdrawals by the operator were again lowered. The next pressure recording showed a 6-lb. rise to 369 p.s.i., then 366, and 355 p.s.i.

In mid-1941, unfortunately, competitive drilling of 10-acre wells in the southeastern part of the pool, which were produced at high rates, resulted in a precipitous drop in pressure. Next pressure was only 289 p.s.i., a 66-lb. decline. This development was not part of the scientifically planned program of the major operator. Detrimental effects created by this phase are shown by the isobaric map in Fig. 2, where reservoir pressure in the small southeastern locality is noted to be well below saturation pressure. Circumstances caused the wells in this area soon to have low productive capacities.

The practice of using the natural water drive to maintain bottom-hole pressures at high levels, however, was restored by the major operator with adjustments to withdrawals on its properties being made at two intervals during 1942. These resulted in maintaining pressures practically constant, with successive averages being 285, 279, 283 and 298 p.s.i.

Water encroachment has been nearly uniform, with very little fingering or erratic water invasion, as shown in Fig. 3. Average pressures have been maintained above the bubble point (270 p.s.i.) and in the large central unflooded area the slowly inward moving water front keeps the oil saturation at an amount probably close to 100 per cent. Proof of this is shown by some of the wells in the central part of the pool still having productive capacities as high as they were 5 years ago.

2—Mount Vernon Pool—Waltersburg Sand

A—Pool Data and Producing Conditions

Location is in Posey County, southwestern Indiana. Waltersburg sand (upper Chester, Mississippian) is principal productive formation. Depth is 1,960 ft., thickness 20 to 25 ft., porosity 20 per cent, average horizontal permeability about 725 md. or more. Original reservoir pressure was 790 p.s.i., accompanying gas in solution only 22 cu. ft. per bbl., oil viscosity 6.5 centipoises.

The structural feature is anticlinal, with a northeast-southwest fault cutting the southeastern portion. The Waltersburg covers 385 productive acres, has closure of about 25 ft., and is water bearing offstructure. There are 14 wells producing from the formation.

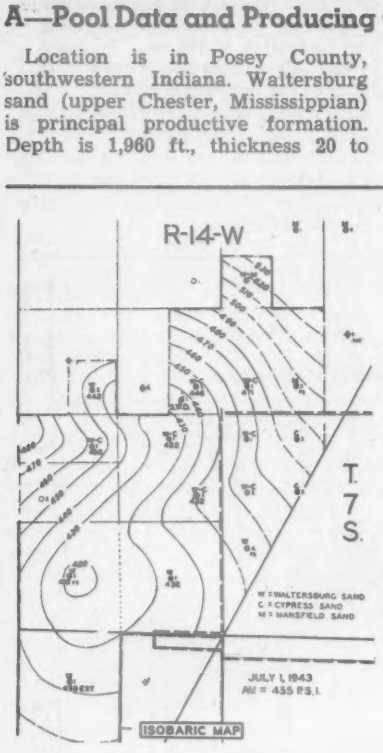


Fig. 5: Pressure distribution

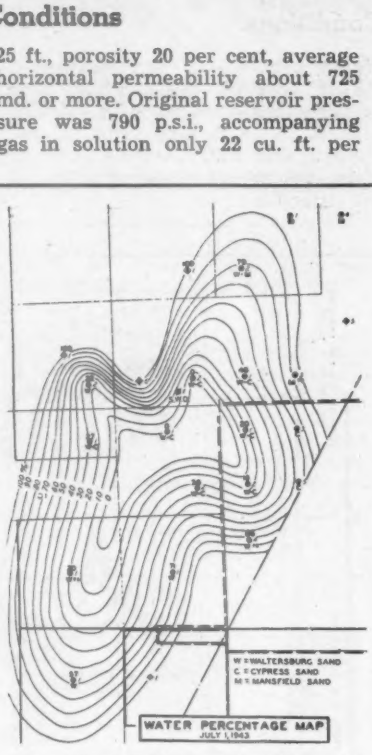


Fig. 6: Uniform water influx

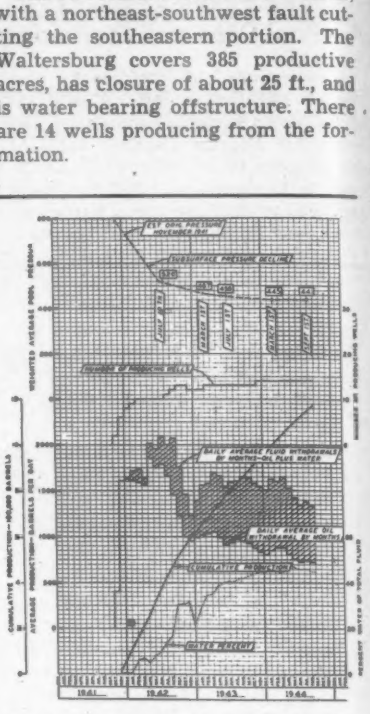


Fig. 7: Chart of complete production data, wells, and pressures for Waltersburg

B—Production Practice and Reservoir Performance

Presence of a strong water drive in the Waltersburg reservoir as the only important energy source has been evident since the beginning of development in the pool. Some of the first wells drilled would flow by heads despite the low gas-oil ratio. Only four of the Waltersburg wells now producing made water initially, but the high vertical permeability permitted rapid coning as producing pressure declined. All but two wells were producing water within a few weeks after completion. Incidentally, it was found impossible to complete commercial Waltersburg wells where only 5 or 6 ft. of oil sand was present above the water level.

To retard the rapid water encroachment and coning, producing rates on the properties of the principal operator in the pool were reduced to a maximum of 250 bbl. per well per day in February 1942 and again to 100 bbl. per well in October of the same year. There has been no change in the oil-withdrawal rate of such operator since then and seven of his wells are still capable of producing above that at this time.

The first subsurface pressure survey, made in July 1942, while the 250-bbl. rate was still in effect, showed average pressure of 520 p.s.i., a decline of 270 lb. There was a low-pressure area in the central portion of the pool, surrounded on all sides by ascending pressures.

Bottom-hole-pressure distribution as of July 1, 1943, 9 months after inauguration of the 100-bbl. producing rate, is illustrated in Fig. 5. In most respects the pattern of this isobaric map is quite similar to earlier distributions, although a more desirable trend toward pressure equalization between the edges and central part of the reservoir is in evidence.

Fig. 6 represents a water percentage map which shows the results of a production survey made in July 1943. There is similarity to structure contours in the pattern, resulting from advancement of water upstructure from all sides of the pool. Movement of the zero per cent water contour from November 1941 to September 1942 indicates influx by water during the period of high fluid withdrawal was rapid compared to the moderate changes since then.

A graphic review of pressure and fluid-production history of the Mount Vernon pool is presented in Fig. 7. Here again the effect of fluid withdrawal rate upon both average reservoir pressure and water production is quite evident. The 270-lb. pressure drop to July 1942 reflects a decline rate of 6.4 lb. per 10,000 bbl. of oil produced. Between March 1943 and July 1943 a decline of 12 lb. was registered, or only 1 lb. for each 10,000 bbl. of oil produced. This followed the operator's inaugural of his 100-bbl.-per-well day rate.

The proportion of water produced increased at an average rate of 2.7 per cent per month during the first 11 months of producing life and amounted to 30 per cent of the total fluid in September 1942. During the next 9 months, the average rate of water percentage increase was only 1.1 per cent per month. The trends indicated here continued through 1943 and by March 1, 1944, average pressure was 445 lb., a decline of 10 lb. in the preceding 8 months. The current pattern of pressure distribution is very similar to that of July 1943, with the average pressure for September 1944 being 441 p.s.i. or a decline of 4 lb.

The Mount Vernon pool's Waltersburg reservoir reached its satisfactory present status through efficient use of the water drive present. With an accumulated oil production of 1,200,000 bbl., reservoir pressure is still relatively high, and through usage by the principal operator of optimum rates, water coning has been retarded and uniform edgewater encroachment maintained on his properties.

3—Louden Pool—Devonian Lime

A—Pool Data and Producing Conditions

The Devonian lime reservoir of the Louden pool, Fayette County, Illinois, occurs at a depth of approximately 3,000 ft., and covers a total of 3,000 productive acres. Majority of this acreage is shown on the map in Fig. 8. Immediately northeast but not shown on the map is a small structural "saddle," adjoined by a second productive area of much smaller size.

The main porosity and pay intervals are found starting approximately 90 ft. below the top of the Devonian, are vuggy in character, and are scattered through a considerable thickness of section. Under the crest of the structure, the upper part of the porous zone is saturated with oil, but is limited to maximum thickness of 50 ft. by the water table which underlies and defines the productive extent.

First development, starting in April 1941, was on 20-acre basis but the later and majority of drilling was one well to 40 acres. Initial bottom-hole pressure was 1,350 p.s.i. The vuggy porosity is varied but apparently on the whole rather well interconnected.

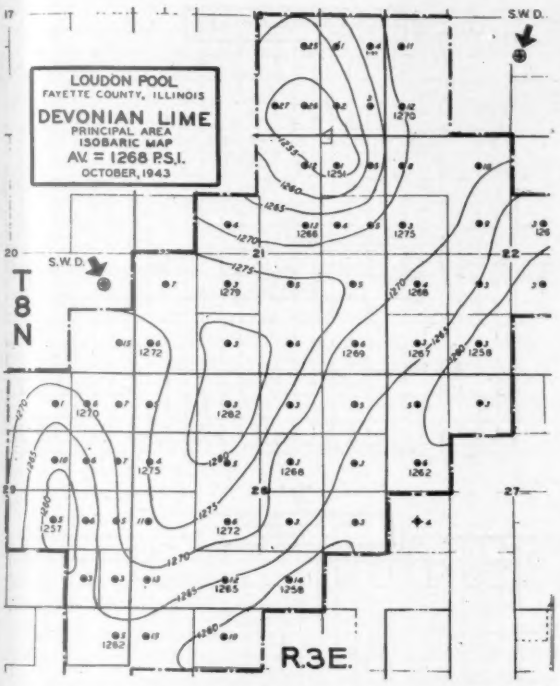


Fig. 8: Isobaric map. Note salt water return wells

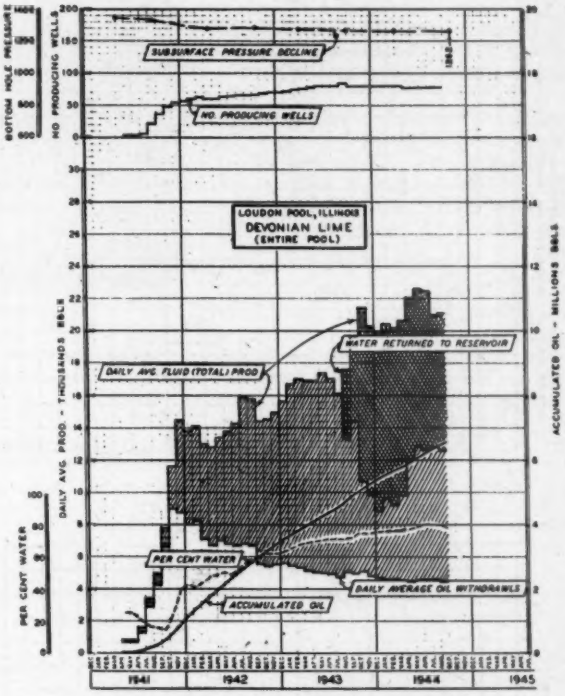


Fig. 9: Chart of production data and pressures

B—Production Practice and Reservoir Performance

Active movement of water into the oil reservoir was recognized early in the life of the pool and immediate provisions were made to utilize this source of natural energy.

To take full advantage of the water drive by preventing erratic encroachment of water and reduction of reservoir pressure below the gas-saturation point of the crude, several adjustments in oil-producing rates were made by the principal operator. In Fig. 9 pertinent production data and subsurface pressure history are given.

Although oil production has been decreasing, the rate of water production from the pool has been increasing so that total volume produced from the reservoir has remained on a slightly upward trend. There has been an increase from 14,000 bbl. per day during the first of 1942, to 20,000 bbl. per day by the middle of 1944. A very slow reduction in reservoir pressure has been concurrent with this advance in rate of total fluid withdrawal. Equalization of pressure throughout the entire reservoir, after a shut-in period of 12 to 24 hours, is exhibited by the isobars given in Fig. 8. The data shown were obtained during the October 1943 subsurface-pressure survey, which revealed average reservoir pressure at that time of 1,268 p.s.i. Maximum variance between the minimum value of 1,251 p.s.i. and the maximum recorded pressure of 1,282 was only 31 p.s.i. Some of the low pressures coincide with areas where the water-producing rates have been high.

In the fall of 1943, two salt-water disposal wells were completed in the base of the producing formation for the dual purpose of disposing of the produced water volumes and supplementing the natural reservoir energy. One of these two wells is located on the structural saddle midway between the two Devonian closures. (The location has been moved southwestward on the map in order to include it.) The second is located on the west flank of the south pool. The major volume of the salt-water production now being returned to the Devonian reservoir at these two locations. A subsurface-pressure survey recently completed shows that a definite retardation in the rate of pressure decline has been effected by the water returned at these input wells. The rate of bottom-hole-pressure decline per volume of total fluid production during the 6 months following initial injection of water to the two wells was only one-half that prior to injection. It is apparent that future pressure decline in the reservoir will be very slow and will remain well above the saturation pressure of the oil.

4—Louden Pool—Weiler (Cypress), Paint Creek, and Benoist (Bethel) Sands

A—Pool Data and Producing Conditions

Over practically the entire extent of the large anticlinal fold comprising the Louden pool, oil production is found in the Weiler (Cypress) sand at 1,390 ft., the Paint Creek at 1,460 ft., and the Bethel (Benoist) at 1,500 ft. Characteristic of shallow, offshore deposits, the sands in the reservoir exhibit wide variances in thickness, permeability, and porosity. The individual sands average about 20 ft. in thickness, about 80 md. in permeability (range 0 to 500), 18 per cent in porosity, and have average interstitial water content of 30 per cent.

Water does not underlie the oil in the center of the pool, but the edges of production are determined in most part by a water-oil contact on the flank. While the areal limits of this contact vary within the same sand as well as between sands, there has been no evidence of substantial water influx into the formations in the area.

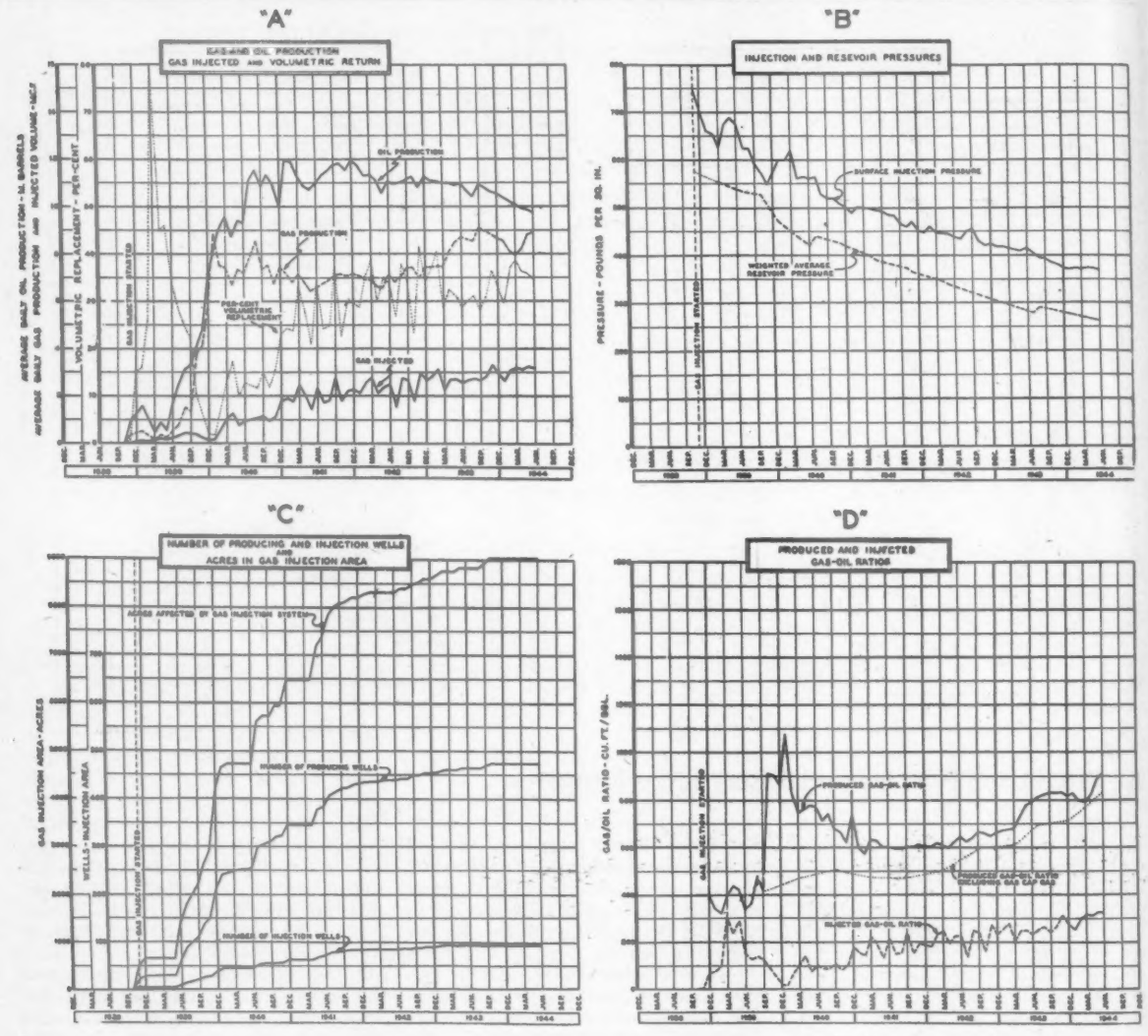


Fig. 10: Four charts showing production data and gas-injection details from beginning of development

B—Production Practice and Reservoir Performance

To obtain high ultimate recovery, a program of returning the produced gas to its properties was inaugurated by one company early in the life of the pool, in the form of a pilot project. From the date of initial injection to five wells in November 1938, on the pilot area of 640 acres, the program expanded so at the conclusion of principal development in October 1943, over 9,000 acres were being influenced by gas at 96 injection wells.

Development in the gas injection area was made on the sunflower well spacing pattern, providing two oil wells on each 40 acres, with the wells being located in the center of diagonal 10-acre tracts. This system provides an octagonal design, placing eight producing wells around a central gas injection well, with each oil well directly affected by two input wells.

In completing the producing and gas injection wells, all sands in the Chester series capable of producing oil were exposed in the same well bore. In the multisand oil wells, all horizons exposed through win-

(Continued on page 56)

The Volume Factor per Barrel of Condensate

*by Park J. Jones**

Mechanics of Producing Oil, Condensate, and Natural Gas

PART 14 OF A SERIES

Condensate is defined as the liquid obtained when the production of retrograde gas from a well is processed in a plant. The composition of condensate and the quantity of condensate per unit of well production depends upon plant conditions as well as upon the composition of the production. In turn, the composition of well production depends upon the composition of the reservoir fluids which are displaced, or expand, into a well bore. The gases may contain a small per cent by volume of a reservoir liquid. A gas out of which a liquid condenses at reservoir temperature upon reduction of pressure is called a retrograde gas.

The volume factor for a condensate is the space occupied in a reservoir by a barrel of condensate. Other things equal, the number of barrels of condensate in a reservoir is inversely proportional to the volume factor for condensate. The purpose of this article is to illustrate how volume factors per barrel of condensate are obtained. The discussion is limited to undersaturated reservoir gases, gases at dew-point pressure, and to gases in which the volume per cent reservoir liquid is comparatively small.

A PHASE diagram is illustrated in Fig. 14-1. The curve P_b corresponds to the bubble-point curve of liquids. A bubble-point curve for a reservoir liquid indicates the pressure at which solution gas begins to evolve. The dashed curve P_d corresponds to the dew-point curve of reservoir gases. A dew-point curve indicates the pressure at which a liquid begins to condense out of a gas. According to Fig. 14-1, a liquid can condense by compressing a gas as, for example, in a natural-gasoline plant. But a liquid can also condense by reducing the pressure on a gas as, for example, in producing gas from certain reservoirs. A gas out of which a liquid condenses upon reduction of pressure at reservoir temperature is called a retrograde gas. The liquid content of such gases is called condensate.

The point in Fig. 14-1 where the bubble-point and dew-point curves meet corresponds to the critical pressure and temperature of a reservoir fluid. At this point the solubilities of gas in liquid and liquid in gas are the same. The densities of the two phases are the same. The compositions, viscosities, and specific gravities are also identical. But the interfacial tension between the two phases approaches zero.

The highest temperature at which a gas phase can coexist in equilibrium with a liquid phase is called the critical condensation temperature or, more briefly, the cricondentherm.†

*Production consultant, Houston.

The Phase Diagram for Condensate

Fig. 14-2 illustrates that portion of a phase diagram which is of interest in producing condensates. This figure is an enlarged portion of the preceding one in the region between the critical temperature and the cricondentherm. Near the critical temperature, a comparatively small decline in pressure can cause considerable condensation out of the gas not produced. Near the cricondentherm, point X, a comparatively large decline in pressure results in negligible condensation.

Accordingly, the volume per cent liquid resulting from a decline in reservoir pressure may vary considerably. It depends on the composition of the gas in place and reservoir temperature.

†Cummings, Stones and Volante, IEC, 25, 728 (1933).

Compressibility Factors for Condensates

A compressibility factor may be defined as the ratio of the volume occupied by a given weight of a fluid to the volume that would be occupied by the same weight of an ideal gas. Compressibility factors for

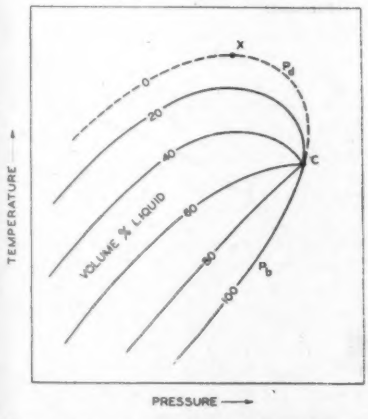


Fig. 14-1: Illustrating a phase diagram. Point (C) represents critical pressure and temperature; (P_b), bubble-point curve; (P_d), dew-point curve; (x), the cricondentherm.

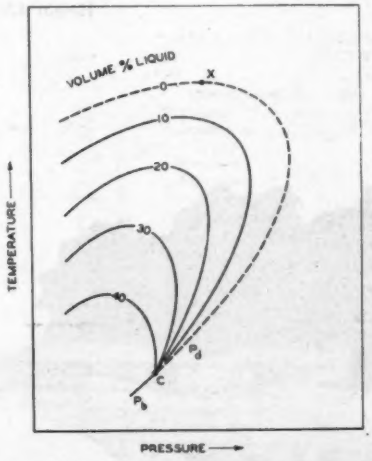


Fig. 14-2: Illustrating condensation upon reduction of pressure in condensate reservoirs

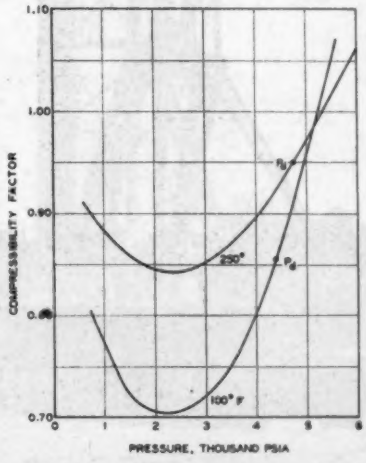


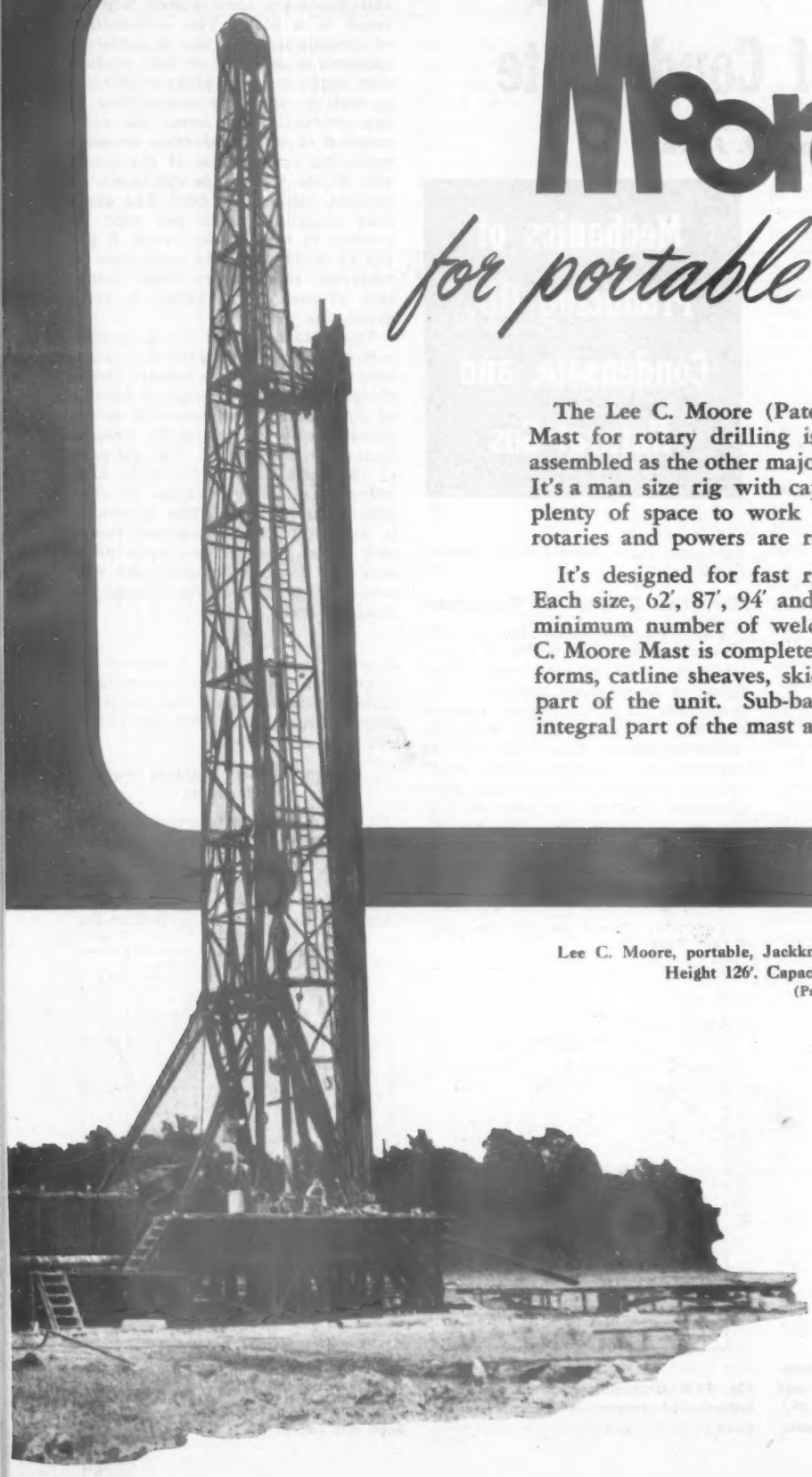
Fig. 14-3: Compressibility factor vs. pressure and temperature for a retrograde gas. Condensation begins at points P_d. (After Sage and Lacey)

Moore

for portable Drilling

The Lee C. Moore (Patented) Jackknife Cantilever Mast for rotary drilling is as easily transported and assembled as the other major equipment used on a well. It's a man size rig with capacities to 415,000 lbs., with plenty of space to work in — standard draw-works, rotaries and powers are readily accommodated.

It's designed for fast rigging-up and dismantling. Each size, 62', 87', 94' and 126' is assembled from a minimum number of welded steel sections. The Lee C. Moore Mast is complete, crown-block, ladders, platforms, catline sheaves, skid type steel base, etc., are a part of the unit. Sub-bases designed to become an integral part of the mast are available.



Lee C. Moore, portable, Jackknife Cantilever rotary drilling mast. Height 126'. Capacity Rating 415,000 lbs.
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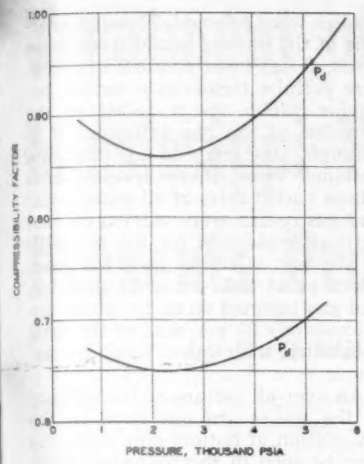

Fig. 14-4: Compressibility factor vs. pressure at 220° F. for two different retrograde gases. Condensation begins at points P_d. (After Sage and Lacey)

gases which condense a liquid upon reduction of pressure are influenced by the condensate. Fig. 14-3 is an illustrative example of compressibility factors vs. pressure and temperature for a given retrograde gas. The pressure at which a liquid starts to condense is denoted by P_d, the dew-point pressure.

Fig. 14-4 illustrates the compressibility factors for two different retrograde gases at 220° F. The volume per cent liquid in this example, and the preceding one, is zero at the dew-point pressure. But it increases upon reduction of pressure up to about 2.5 per cent at 3,000 p.s.i.a. At pressures less than 3,000 p.s.i.a, the volume per cent liquid in these two examples decreases.

Comparisons between experimental and computed volume factors demonstrate that the volume factor for gases containing a small volume per cent liquid can be computed by the pseudocritical method* The method is not exact, but the degree of accuracy is sufficient for production purposes.

TABLE 14-1—ILLUSTRATING COMPUTATION OF VOLUME FACTOR FOR A RETROGRADE GAS

Constituent—	Mole (per cent)	P_c	P_r	T_c	T_r
Methane	91.00	673	612.4	344	313.0
Ethane	3.20	712	22.8	550	17.6
Propane	1.40	617	8.6	666	9.3
i-Butane	.60	528	3.2	734	4.4
n-Butane	.80	551	4.4	766	6.1
i-Pentane	.40	483	1.7	830	2.5
n-Pentane	.20	485	0.9	846	1.7
Hexanes	.40	443	1.8	908	3.6
Heptanes+	2.00	320	6.4	1,160	23.2
	100.00		662.2		381.4

Heptanes+

Molecular weight = 160

Specific gravity = 0.800

$$P_R = \frac{4,800}{662.2} = 7.25$$

Reservoir

Pressure = 4,800 p.s.i.a

Temperature = 200° F.

$$T_R = \frac{660}{381.4} = 1.47$$

$Z = 0.93$

Volume factor = 504 TZ/P = 0.643 bbl. space/M.c.f.

The Volume Factor for Condensate

Table 14-1 illustrates a computation of the volume factor for a retrograde gas. The second column gives the molal composition of the gas. The pseudocriticals for the gas are computed by the method discussed in the preceding article. The gas was found at a pressure of 4,800 p.s.i.a. and a temperature of 200° F. The corresponding reduced pseudocriticals are as shown in the table. The corresponding compressibility factor is 0.93 and the volume factor, 0.643 bbl. of reservoir space per thousand cubic feet of the gas. The corresponding volume factor per barrel of condensate depends on how much liquid a plant can extract from the gas.

Table 14-2 illustrates a method for computing plant recovery. In this example, it is assumed that a plant will recover 30 per cent of the propane in the gas, 80 per cent of the butanes, 99 per cent of the isopentane, and 100 per cent of the heavier constituents. Under the conditions of this example, there are 49.54 bbl. of condensate in a million cubic feet of the reservoir gas. The corresponding volume factor is 12.97 bbl. of space per barrel of condensate.

Fig. 14-5 illustrates volume factors for a retrograde gas and the volume of liquid condensed from the gas at 220° F. The curve (G) is for the gas and liquid phases combined. The (L) curve is for the volume of liquid condensed out of the gas. The liquid begins to condense at the pressure P_d, dew point.

The limits for (1) condensate volume factors and (2) barrels of con-

*N.G.A.A. Tentative Standard Method for Calculation of High-Pressure Gas Measurement.

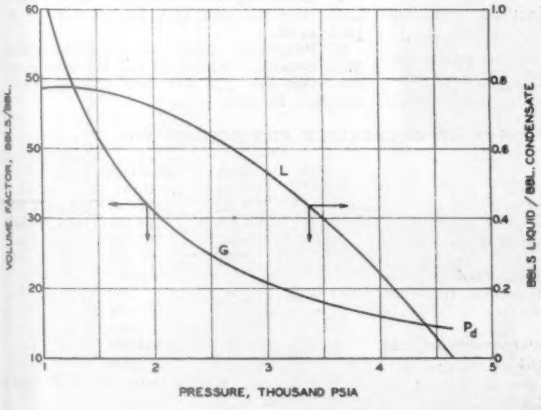

Fig. 14-5: Illustrating (G) volume factor for a retrograde gas and (L), barrels of reservoir liquid per barrel of condensate at 220° F. P_d is dew-point pressure. (After Sage and Lacey)

TABLE 14-2—ILLUSTRATING COMPUTATION OF VOLUME FACTOR FOR CONDENSATE

Constituent—	Mole (per cent)	Bbl./M.M.c.f.	Plant recovery— Per cent	Bbl./million
Propane	1.40	654	30	2.74
i-Butane	.60	777	80	3.72
n-Butane	.80	751	80	4.80
i-Pentane	.40	873	99	3.45
n-Pentane	.20	863	100	1.73
Hexanes	.40	979	100	3.92
Heptanes+	2.00	1,509	100	30.18
				49.54

Volume factor = 643/49.54 = 12.97

TABLE 14-3—ILLUSTRATING COMPUTATION OF RESIDUE GAS

Constituent—	Mole (per cent)	Per cent as gas	Residue gas vol., per cent
Methane	91.00	100	91.00
Ethane	3.20	100	3.20
Propane	1.40	70	.98
i-Butane	.60	20	.12
n-Butane	.80	20	.16
i-Pentane	.40	1	....
			95.46

Cu. ft. residue gas/million of reservoir gas = 954,600

Cu. ft. residue gas/bbl. condensate = 954,600/49.54 = 19,200

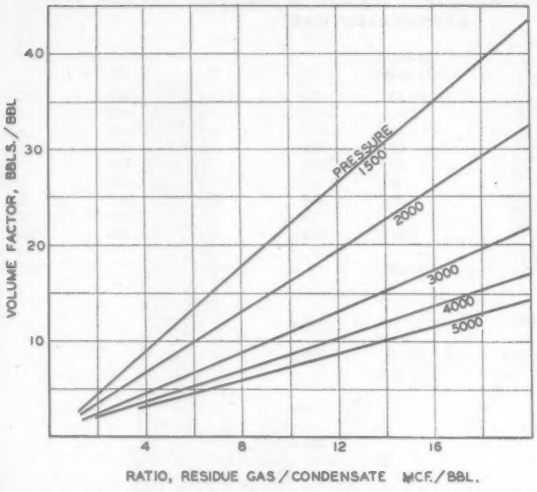

Fig. 14-6: Illustrating volume factor vs. M.c.f. of residue gas per barrel of condensate at 220° F.

densate per million feet of retrograde gas likely to be found in reservoirs are roughly as follows:

Bbl. space per bbl. condensate	Bbl. condensate per million feet gas	G.p.m.
50	15	0.63
5	150	6.30

A high volume factor may not pay out the investment required for wells and a plant. On the other hand, a low volume factor indicates either some liquid along with gas in a reservoir or else that the properties of the reservoir gas approach those of a reservoir liquid.

Volume Per Cent Liquid

At the dew-point pressure P_d in Fig. 14-5, the volume per cent liquid is zero. Upon further reduction in pressure, the volume per cent liquid increases up to a maximum of about 2.6 per cent in the pressure interval from 3,000 p.s.i.a. down to 2,500 p.s.i.a. Corresponding to pressures less than 2,500 p.s.i.a., the volume per cent liquid decreases and approaches 1.2 per cent at 1,000 p.s.i.a. Curves of the type shown in Fig. 14-5 are used for estimating the recovery from condensate reservoirs by cycling and by not cycling.

Volume Factors vs. Gas-Condensate Ratios

Table 14-3 illustrates a computation of the residue gas corresponding to the plant recovery in Table 14-2 from the retrograde gas shown in Table 14-1. In this example there are 19,200 cu. ft. of residue gas per barrel of condensate.

Obviously, a volume factor for a condensate depends not only upon the composition of the retrograde gas in place but also upon plant conditions. The higher the residue gas per barrel of condensate, the higher the volume factor per barrel of condensate. Fig. 14-6 illustrates the effect of residue-gas - condensate ratios on volume factors at 220° F. for a given retrograde gas. More generally, the higher the gas-liquid ratio, the higher the volume factor. This statement will be illustrated in the next article for gas-oil ratios.

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Production Program

(Continued from page 48)

dows in the casing strings were shot with nitroglycerin to obtain satisfactory producing rates. Input wells were completed so that the various horizons exposed within the well bore through gun perforations in the casing were separated mechanically with packers and tubing strings to provide for the control of gas injection rates. No segregation of the producing zones was attempted in the oil wells.

A graphical presentation of the rates of oil and gas production, gas injection pressure, volume of gas returned, and behavior of reservoir pressure is shown in Fig. 10.

Influence of continuous drilling operation makes it difficult to evaluate certain factors in the progress of the program. For this reason, special areas for detailed experimental studies were selected. Through analysis of the data obtained from these areas, it has been possible to recognize definite trends in reservoir behavior which are a result of the stimulus of the gas injection. It is through the analysis of the data obtained from these special areas where varied rates of oil withdrawal and gas return were carried on that current production for the oil wells in the gas injection area has been taken at 25 bbl. per well per day, and gas injected so as to return approximately 35 per cent of the total volumetric withdrawal from the reservoir.

An over-all picture of the efficacy of the gas-return operation in the retardation of bottom-hole pressures may be seen in the following table, where it will be noted that the later pressure decline per million barrels of oil produced has been much less than during the early stages where the program was incomplete and smaller gas volumes were being injected.

Time interval—	Press. decline, p.s.i. per million bbl. of oil produced
Initial to July 1939	74
July 1939 to October 1939	36
October 1939 to January 1940	47
January 1940 to July 1940	23
July 1940 to December 1940	12
December 1940 to May 1941	7
May 1941 to November 1941	8
November 1941 to May 1942	11
May 1942 to November 1942	12
November 1942 to August 1943	6
August 1943 to August 1944	11

In the preparation of this article, grateful acknowledgment is made of the assistance of J. D. Gustafson, eastern division engineer, Carter Oil Co., Mattoon, Ill., and W. F. Eiting, Jr., southern division engineer, Carter Oil Co., Shreveport, La.

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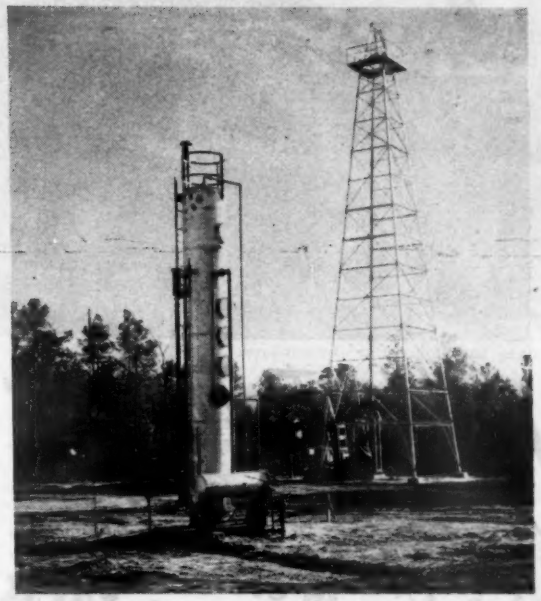
SUMMARY DATA OF OPERATIONS FOR AUGUST 1944

		Daily average	Monthly total	Accumulated total
Operating data—				
Gross fluid produced, bbl.			9,780	303,192	22,875,546
Gross oil produced, bbl.			9,121	282,756	22,266,332
Gas produced, M.c.f., estimated			8,568	265,606	15,478,499
Gas injected, M.c.f.			3,006	93,188	3,836,007
Per cent of produced gas injected			.....	35.1	.....
Produced gas-oil ratio (dissolved, 102; free, 837), total			.....	939	.....
Injected gas-oil ratio			.....	330	.....
Net gas-oil ratio			.....	609	.....
Converted fluid withdrawal, reservoir, bbl.			.....	2,546,800	.....
Volumetric return, per cent			.....	34.4	.....
Injection wells—	Total		Weller	Paint Creek	Bethel
Number	98		....	....	....
Sand faces exposed to input	....		89	52	34
Average injection pressure, p.s.i.	....		346	385	353
Producing wells—					
Number	477		....	....	....
Sand faces exposed for production	....		423	186	169

Treatment of Heavy Oil Emulsions in Mississippi Field Presents Problems

by Neil Williams



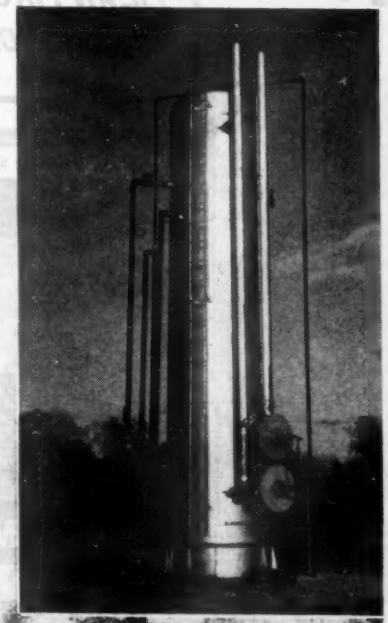
PRODUCTION in the Eucutta field, Wayne County, Mississippi, consists of a heavy-gravity, asphaltic-base oil, which in most wells carries a b.s. and w. content varying from 2 to 3 per cent to about 15 per cent. The emulsion is extremely difficult to treat, and the oil hard to handle when cold.

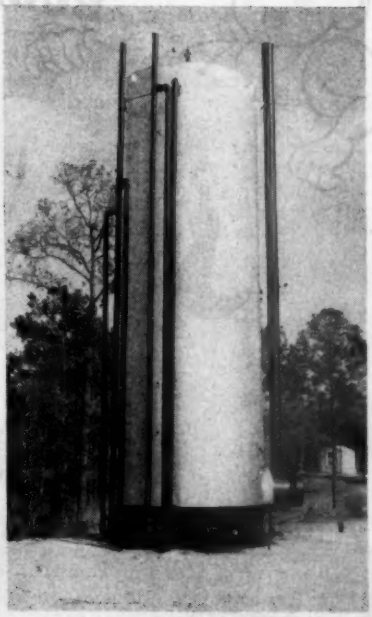
Use of both chemicals and heat is required for treating. Chemicals are injected directly into the lead lines by means of conventional small chemical pumps. In most instances the injection is made at the well head with an individually installed pump. In other cases, a single pump is installed at the central battery for a group of wells.

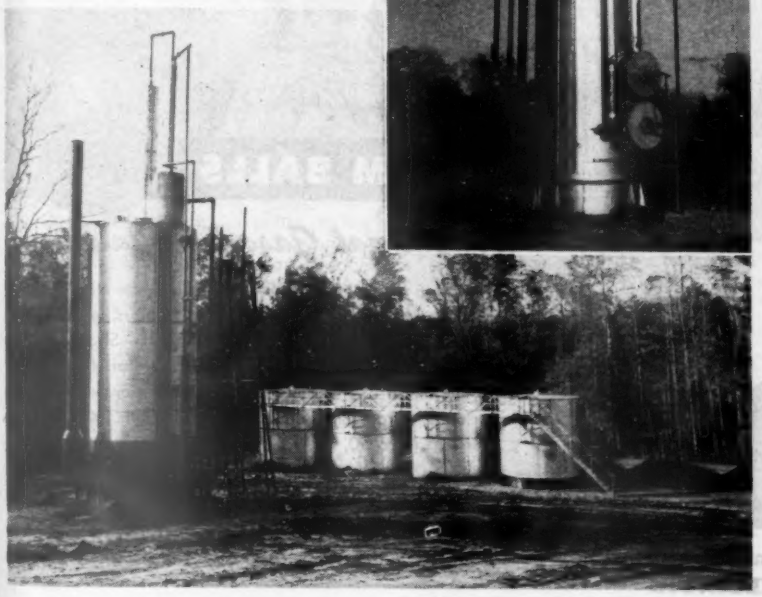
Combination heaters and treaters are used exclusively with one unit being set at each central lease battery. These units, of commercial design and manufacture, function not only as heaters and treaters, but also as separators for gas and gun barrels for settling and removal of the b.s. and w.

Four different types of treaters, representing as many manufacturers, are being employed in the field. One unit is provided at each central battery for lease. Through this the production of all wells on the lease is pumped. The largest single installation now is handling the production of 10 wells with capacity for additional wells as completed.

Operation of these







Types of combination heater and treater units being operated in Eucutta field, Wayne County, Mississippi. Top, National unit, showing typical pumping well. Center, Parkersburg installation (left), and large Black, Sivalls & Bryson unit (right). Bottom, Burt treater with typical lease stock tank battery in background

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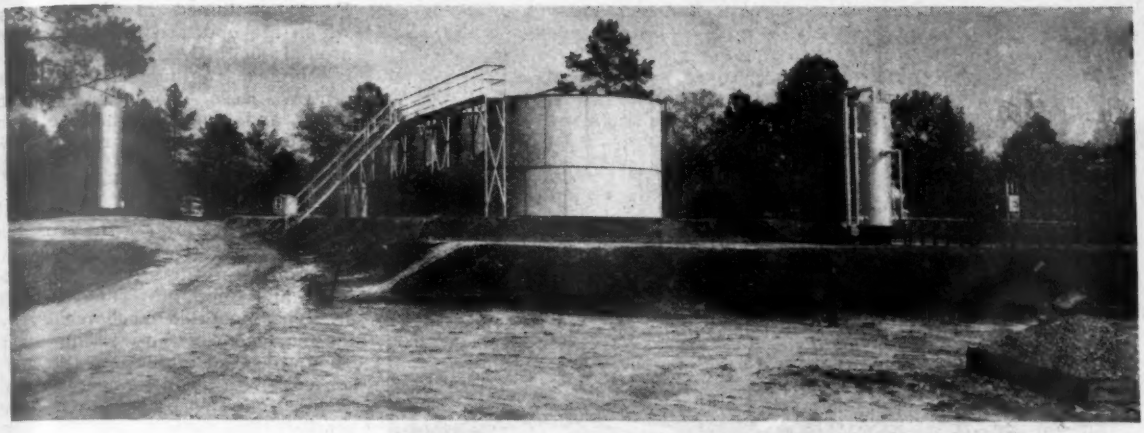


Central tank battery and treater installation at Eucutta showing combination heater-treater (left background) with additional separator (right), and manifold for 10 producing wells

treaters is proving highly effective in that a difficult oil is being treated down to less than 0.5 per cent of basic sediment and water. The principal complication lies in the lack of sufficient gas in the field as fuel for their operation.

Oil production is undersaturated and the volume of gas recovered in many instances barely is adequate to meet the needs for pumping, let alone fuel for the heaters. Average gas-oil ratio is not more than 50 cu. ft. per bbl. With a current daily production of less than 2,500 bbl. from approximately 35 wells, total available gas for the field is only about 125,000 cu. ft. or 3,570 cu. ft. per well.

With few exceptions, all production is by pumping, starting at completion of wells. Individual pumping units equipped with multicylinder gas-gasoline engines of from 15 to 35 hp. each are being used. Although in many wells, after standing the fluid will rise to the top and all but slop over, there is not sufficient pressure to maintain natural flow. A hydrostatic drive is indicated but its effectiveness is reduced due to the fact that the producing section is very shaly and permeability of sands low.

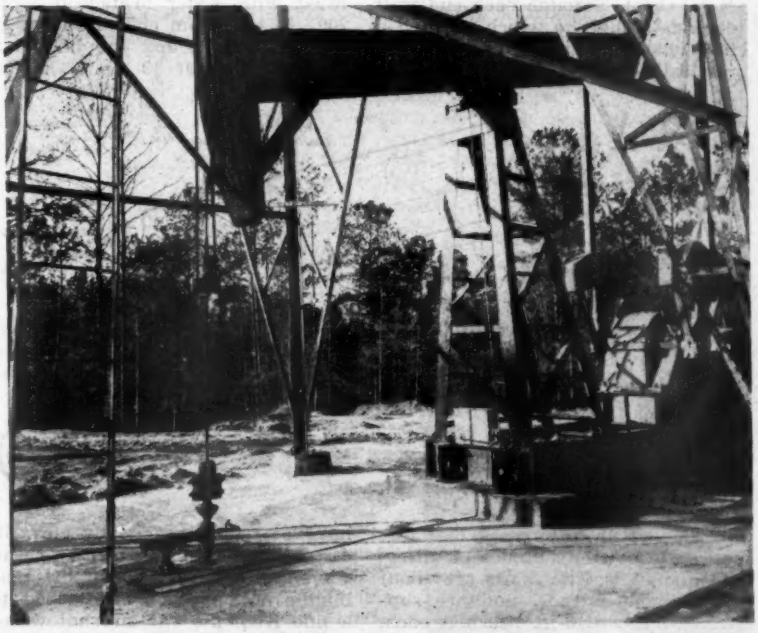
Limited outlet capacity for field production has been one of the complicating factors. If pumping rates are reduced to a point that production can be handled and moved continuously, there frequently is not enough gas for regular lease operation. On the other hand, if production is increased to make available additional gas for current use, lease storage may be filled before the oil can be moved, forcing periodic shutdowns.

Difficulties of periodic operation arise from the fact that wells usually must be pumped at least 30 minutes after shutdowns before gas becomes available for lease needs. So far as pumping is concerned, the problem is met by having a small tank of gasoline at each unit and operating the engine on this fuel until there is enough gas for this purpose. However, the problem of running the treaters until lease gas is produced is not so easily solved.

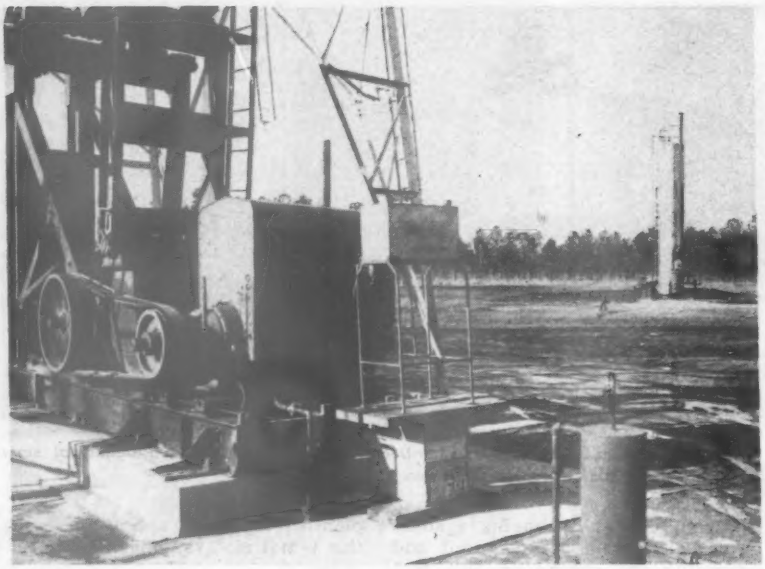
When cold, the oil and emulsion have a tendency to congeal in the treaters and cannot be moved. Consequently, until heated, the treaters cannot be operated, and in turn the wells cannot be produced through them. For this reason, if a lease treater is to be shut down, some provision must be made for fuel from another lease or some other source to heat the treater until lease production builds up its own gas supply. Since gas is not overly plentiful even on operating leases, this is not always convenient to arrange.

With a view toward maintaining continuous operation of treaters under all circumstances regardless of the supply of gas, consideration now is being given to designing a suitable oil-burning heater which can be used in the treaters, replacing the present gas heaters. As oil productivity of wells declines with continued life of the field, it is anticipated that gas resources will be further depleted to a point that other fuel will be necessitated.

Once heated and kept moving no unusual difficulty is experienced in treating the oil. In normal operation, a temperature of approximately 160°



Pumping unit showing chemical injector installation at base of samson post. Injector is mechanically operated by rod connection to walking beam



Pumping-engine installation showing small tank containing gasoline provided at each unit on which to operate engine until gas supply is built up

F. is maintained in the treaters, which are operated at pressures of around 40 lb. Oil from the treaters is pumped continuously direct to central lease storage. Although heavy and sluggish when cold no additional heating is required to pump it to pipe lines. Gravity of the oil ranges from 18° to 25°, except the production from one well which has about 30°. Bulk of the oil runs from 21° to 22° gravity.

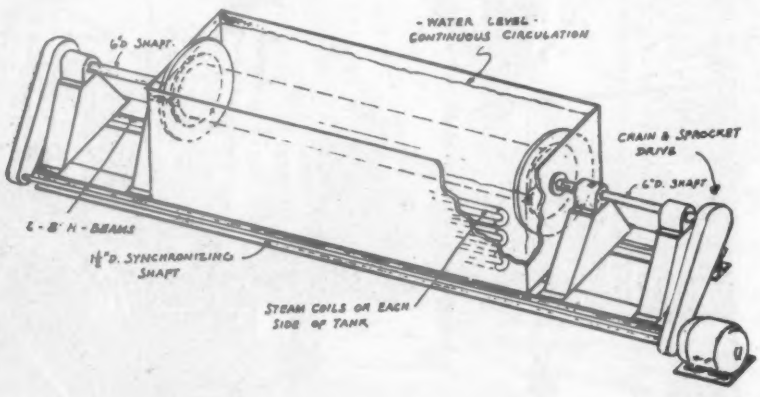
Chemical injectors installed at the individual pumping units usually are types operated mechanically by the movement of the walking beam. They are set at the base of the samson post with a rod connection from their stroke working arm to the beam.

Production of wells at present is restricted by field outlet capacity to a maximum of approximately 150 bbl. daily. This is a recent reduction from a maximum of 300 bbl. daily. While some of the wells will pump from 200 to 300 bbl. daily sustained productivity of the majority is much less.

Heat-Exchanger Tube-Bundle Cleaner Provided by Maintenance Department

FOR cleaning periodically the tubes in heat-exchanger bundles in Sinclair Refining Co.'s East Chicago refinery, the maintenance department has provided a steel tank, 16 ft. by 4½ ft. by 4 ft., made of ¼-in. sheet. Through each end wall extends a shaft to which is fitted a face plate 50 in. in diameter, set vertically on the shaft, the plate being drilled at different radial distances to bolt on bundles of different diameters. The shafts are about 6-in. diameter rods, and are supported by two 10-in. bearings each. A 5-hp. 1,750-r.p.m. electric motor drives these shafts through a reducing gear and a long 1½-in. shaft and sprocket and chain drives, to synchronize the rotation rate of the face plates.

The standard bundle in this refinery is 14 ft. long. A bundle is bolted to the face plates, the vat or tank is filled with water heated to about 200° F. by steam coils installed in the tank itself, and the bundle is rotated at about 13 r.p.m. in this hot water until practically clean of dirt, slime, scale, etc. An overhead traveling crane or hoist lifts the bundle out, a pump is attached to a line from the vat and hot water is sprayed under pressure onto the bundle lying on a platform until it is clean. Formerly a caustic solution was used in the vat; however, it has been found that ordinary plant water is satisfactory for practically all cleaning.



The bundle is then transferred to the boiler shop, placed in a shell of suitable size kept in the shop for this purpose, and is tested under hydrostatic pressure for leaks. When passed by the inspector the bundle is transferred to the storage rack and covered with Filmoil, a rust-protecting product developed in the plant.

An exhaustive list is maintained showing sizes, number and other details of each bundle in the refinery. A graphic record is kept also by number of bundle, the unit and location in the unit where it is in use, and other data pertinent to a systematic program for keeping the exchangers at their highest efficiency.

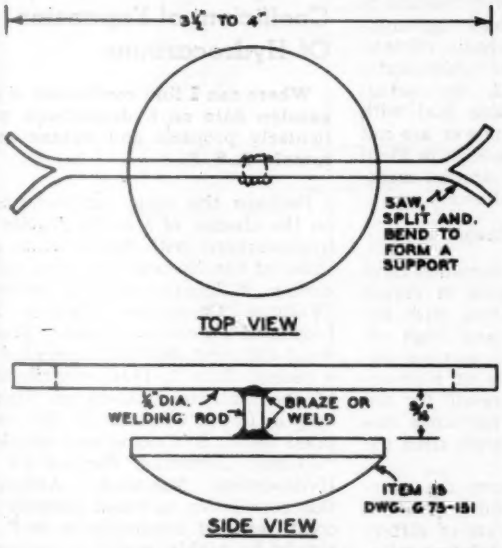
Charles J. Watson and **Oliver T. Joy** have been named representatives of Phillips Petroleum Co. in Colombia. Watson's headquarters are in Bogota and Joy's in Barranquilla. **M. K. Neptune** has been made assistant to **F. W. Floyd**, in charge of all the company's South American operations, with headquarters in Caracas, Venezuela.

L. H. Moore, formerly division superintendent for Gulf Oil Corp. at Kilgore, Tex., has been promoted to superintendent of production and operation in the Shreveport district, which includes North Louisiana, Mississippi, Alabama and Florida. **J. B. Russell, Jr.**, formerly field foreman in the Longview, Tex., district, succeeds Moore at Kilgore.

PLANT PRACTICES

A Simple Babbitting Fixture

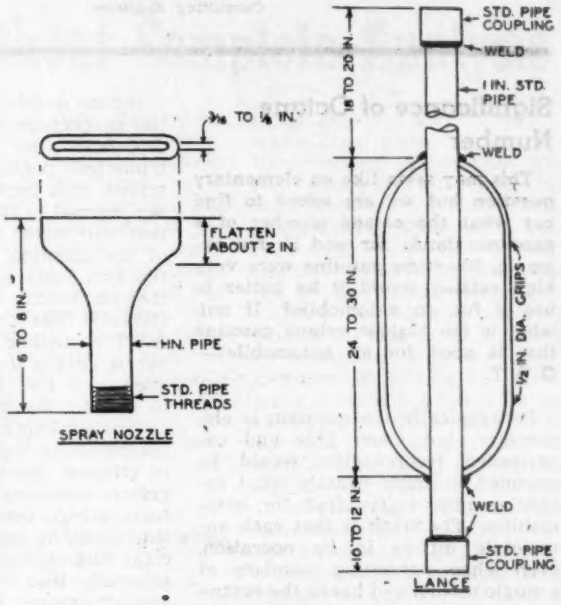
BY using a worn-out exhaust-valve shoe bearing with several inches of tin welding rod an efficient babbitting fixture for pouring the bearings in a Cooper engine exhaust valve rocker arm has been devised by the master mechanic of Cities Service Oil Co.'s Lacy gasoline plant. Shown in the photograph



is a bearing which was poured by this method. Attached to the worn out shoe by welding to its flat surface a length of tin welding rod forms the support for the fixture which is shown in the sketch. The fixture is centered in the rocker arm by resting the supporting ends on the rocker arm casting; no other parts are required for the fixture.

An Effective Method for Cleaning Heat-Exchanger Bundles

A SIMPLE method for cleaning heat exchanger bundles with high-pressure water is carried out at the Wood River refinery of Shell Oil Co., Inc. Water at pressures between 1,000 and 1,200 p.s.i. is forced between the tubes with a fishtail-type nozzle for removing coke and other deposits from the outside surfaces of the tubes. The nozzle and lance shown in the accompanying drawing are the only tools used for the job. The supports upon which the bundle rests during the cleaning operation are equipped with adjustable rollers so that the bundle may be rotated about its



longitudinal axis. A platform about 30 in. high, 48 in. wide and floored with grating provides an operating area for the workmen. The length of the platform is made equal to the maximum length of bundle handled in the cleaning operation. Parallel to and about 15 ft. from the operators' platform a corrugated sheet iron wall, about 8 ft. high, prevents the water stream from passing beyond the working area; the bundle is located between the platform and corrugated sheet iron wall.

An Inexpensive Water Cooler

SERVICEABLE and inexpensive, the drinking fountain shown in the photograph is made of various discarded items. Cooling is done with a ⅜-in. copper coil which is located in the body of a foam-type fire extinguisher. The coil, into which propane is expanded, has its inlet and outlet through the side of the extinguisher body. Water enters the body through the normal bottom of the extinguisher and is drawn off at the opposite end with a pushbutton type valve. The fountain bowl is made of a porcelain reflector and the fountain a short length of light-gage tubing having its lower end closed and its upper end covered with a perforated disk. A light-gage metal cover protects the cooler from direct sun heat. To show details, protecting cover was removed from the installation shown in the photograph.

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

W. L. NELSON

This department was created for the purpose of aiding managers, superintendents, engineers, chemists and all those engaged in various phases of plant operation, as well as those connected with the marketing and utilization of petroleum products. Readers are invited to submit their problems to W. L. Nelson, technical editor. Inquiries must be signed, but only the initials will be printed.

Significance of Octane Number

This may seem like an elementary question but we are asked to find out what the octane number of a gasoline stands for and if, for example, 80-octane gasoline were very high octane, would it be better to use it for an automobile? If not, what is the highest octane gasoline that is good for an automobile?—G. R. T.

Pedagogically the question is elementary, but many able and experienced technologists would be stumped to know exactly what octane number is required for automobiles. The truth is that each automobile differs in its operation, even when comparing members of a single model, and hence the octane number required for a particular vehicle can be determined only by operating the vehicle (preferably in regular service) on gasolines of different octane number. Nevertheless, some statistics of this sort have been accumulated, notably those of Holaday & Happel, "A Refiner's Viewpoint on Motor-Fuel Quality," Petroleum Engineer Reference Annual, page 251, 1943, which indicates the percentage of cars that will operate without knocking when using fuels of various octane numbers, as in the tabulation shown below. For cross-country or 50-m.p.h. travel, the A.S.T.M. octane numbers required to suppress knocking are:

% of Cars	Octane No. Required
0-10	low -55
10-20	55-61
20-40	61-63.5
40-60	63.5-65
60-80	65.0-68.5
80-90	68.5-72.0
90-100	72.0-80.0

Operation—	Road octane number 68	71	74	77	80	83
40 m.p.h	99.8	99.9	100	100	99.9	99.6
20 m.p.m. (¾ throttle)	96.5	96.5	100	101.6	102.5	102.9

Thus, 10 per cent of regular commercial vehicles can use gasoline having octane numbers below 55, whereas at the other extreme are 10 per cent of vehicles (shall we say good vehicles or poor ones?) that require high-priced premium fuels of 72-80 octane number. The relationship is slightly different for vehicles operating at 25 m.p.h. (urban driving) but not significantly so.

Octane number may be defined as the percentage of liquid volume of isooctane (the hydrocarbon, 2,2,4 trimethyl pentane) that must be mixed with heptane (the hydrocarbon normal heptane) to make a fuel that will match the knock tendency of the gasoline being tested when the two fuels are compared under the particular conditions of some standard test method such as the A.S.T.M. method. Thus, octane number is only a measure of the tendency of a fuel to cause an engine to exhibit the performance known as "carbon knock" or "spark knock." Inasmuch as high-compression-ratio or efficient gasoline engines have a greater tendency to knock (on any fuel), a high octane number is considered to be an indication of efficient long-mileage operation. Such is generally true with carefully built aircraft engines but with respect to automotive vehicles and the unfavorable conditions of repair, climate, adjustment, etc. under which automobiles are operated, the actual benefit of a high-octane fuel with respect to mileage or power are not very clear. Van Hartesoeldt & Field stated before the 10th annual meeting of the A.P.I. as follows:

Effect on Mileage

"Octane numbers of gasolines have received much attention in recent years in the public press, with the result that 'high test' and 'high octane' have become synonymous expressions; and the role of high-octane gasoline as a 'cure-all' for the ills of motor car performance has been accepted more widely than the facts warrant."

This same paper shows the average effect of octane number on mileage for a number of cars of different make and model. Relative mileages were:

A few of the cars developed less power and slightly lower mileages with the high-octane fuels. This tabulation indicates an increase in mileage of less than 1 m.p.g. in operating a 68-octane-number engine and an 83-octane-number engine.

One point is agreed upon by nearly all authorities, namely, that a higher octane number than that required to keep an engine from knocking does not increase the power output or mileage of the vehicle. Thus, if a car does not knock when using a 70-octane-number fuel, its performance from a power standpoint will not be improved by using an 80-octane-number fuel.

Several other properties of gasolines are vitally important, much more important than octane number, and hence reference should be made to Questions on Technology, page 62, December 9, 1943, which discusses (1) ease of starting, (2) vapor-lock, and (3) crankcase dilution.

Coefficient of Expansion Of Hydrocarbons

Where can I find coefficient of expansion data on hydrocarbons, particularly propane and butane mixtures?—A. S. K.

Perhaps the most complete data on the change of specific gravity of hydrocarbons with temperature are those of the Natural Gasoline Association of America (Tulsa) entitled, "Volume Correction Factors for Liquefied Petroleum Gases." Somewhat different data are presented in a recent (July 1, 1944) contribution of the National Bureau of Standards in Letter Circular LC-757 compiled by C. S. Cragoe and entitled, "Volume Correction Factors for C₄ Hydrocarbon Mixtures." Although this correlation is based entirely on coefficients of expansion at 60°F., it should be highly useful in estimating the coefficients of expansion of hydrocarbons for which little data exist. Best correlation between data for the 30 hydrocarbons studied was obtained when using vapor pressures as the basis of comparison. This reference gives the following coefficients for a 4-carbon atom mixture which has a vapor pressure of 60 p.s.i. absolute:

Temp. °F.	Coeff. of Expansion
0	0.00105
20	0.00107
40	0.00109
60	0.00111
80	0.00113
100	0.00115
120	0.00118

Engineering Fundamentals

No. 171

A FEATURE OF THE OIL AND GAS JOURNAL

Identifying Waters Without Complete Analysis

IN the absence of complete water analysis, determinations of Cl, total solids, and pH are useful in identifying oil-field waters.

Determination of chlorides.—The following apparatus is needed: A 50-ml. burette, burette stand, several 250-ml. flasks, one 10-ml. pipette, one 50-ml. pipette, several clean glass bottles, a small funnel, several 100-ml. volumetric flasks, a gallon bottle of distilled water, filter paper, a bottle of potassium chromate solution, and a dark glass bottle of 0.1 normal silver nitrate. The sample of water is filtered through a clean filter paper into the 8-oz. bottles. Then, if the water is from shallow depth and low in chlorides, 50 ml. are taken out in the 50-ml. pipette and emptied into the 250-ml. titration flask. If the chloride concentration is high, only 10 ml. of the water are taken with a 10-ml. pipette, emptied into the 100-ml. volumetric flask, and made into 100 ml. with distilled water. Next, the 50 ml. of water in the titration flask are titrated to a faint reddish color with the 0.1 normal silver nitrate using 1 ml. of potassium chromate as an indicator. The best way to titrate the water is to place 100 ml. of distilled water in another 250-ml. flask and add 1 ml. of the potassium chromate solution. Place the distilled-water flask beside the oil-field-water flask and titrate the oil-field water until the color in the oil-field-water flask exactly matches the distilled water color. Record the number of milliliters of 0.1 normal silver nitrate used. One milliliter of 0.1 normal silver nitrate is equivalent to 3.546 ml. of chlorine. To obtain the milligrams per liter of chlorides in the water, therefore, multiply the number of milliliters of silver nitrates used by 71 if 50 ml. of the oil-field water were used, and by 354.6 if 10 ml. of the water were used.

Determination of total solids.—Tables by which total solids of water are determined approximately from the specific gravity of the water are as accurate as the evaporation method, since hydroscopic minerals like calcium chloride are commonly found among the total solids which take up water of crystallization and many times make the determination of total solids by weighing inaccurate. The only apparatus needed is a Westphal balance or an accurately calibrated, large-scale hydrometer and hydrometer cylinder. The specific gravity is determined to the third decimal place, and the parts per million of total solids obtained as follows:

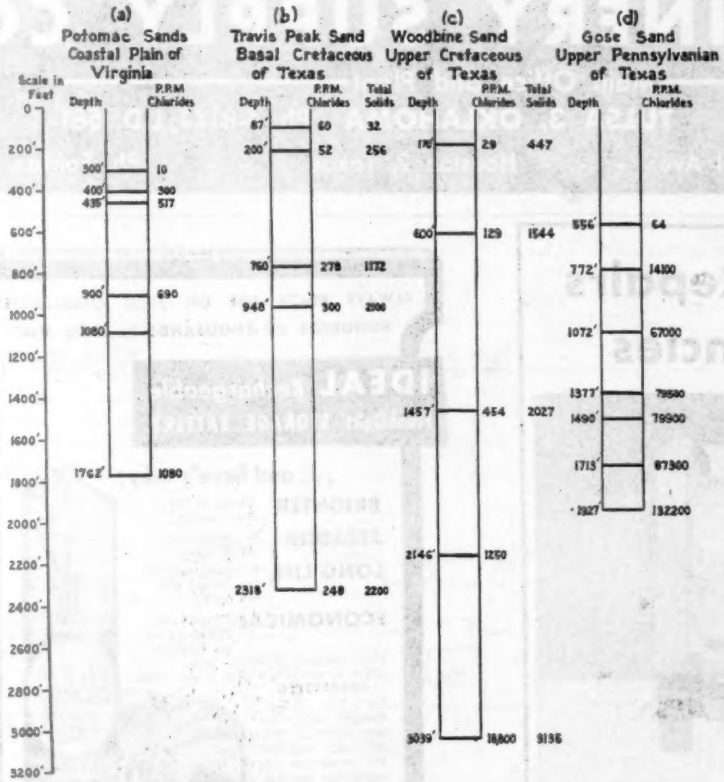


Fig. 1: Graphs showing relation of concentration of chlorides and total solids to depth below the surface in four different water sands. Each graph represents analyses from a series of different wells drilled to the same sand beginning near the outcrop and located progressively farther away downdip from the first until a depth of 2,000 ft. or more is reached. Note that the concentration of the dissolved salts increases rapidly for the first few hundred feet and then more gradually. Data obtained from following sources: (a) D. J. Cederstrom; (b) Ground Water Survey of Texas, sponsored by State Board of Water Engineers and U.S.G.S.; (c) Plummer and Sargent, and (d) Virgil E. Barnes

Relation of specific gravity to concentration of total solids

Specific gravity of water	Approx. tot. solids in parts per ml.
1.020	27,500
1.030	41,400
1.040	55,400
1.050	69,400
1.060	83,700
1.070	93,400
1.080	113,200
1.090	128,300
1.100	143,500
1.110	159,500
1.120	175,800
1.130	192,400
1.140	210,000

If the specific gravity of the underground water is below 1.020, the total solids should be obtained by weighing a porcelain evaporating dish, adding 100 ml. of the water and evaporating to dryness at 100°C. on a water bath or constant-temperature oven.

Series prepared by F. B. Plummer, professor, petroleum engineering school, University of Texas

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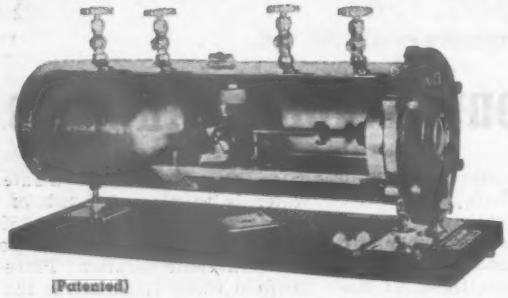

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The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Processing Asphaltic Crudes

CRUDE oils that contain large amounts of asphalt are usually deficient in low-boiling materials, such as gasoline, and even a kerosene fraction is usually not made because of unsatisfactory burning qualities. Thus, the topping operation frequently consists only of a preliminary flash conducted by heat exchange, and the main distillation is accomplished in a vacuum or by means of large amounts of steam. If the pour point of the lubricating oil fractions is low, they are usually processed for oils.

Asphaltic crude oils.—These are of the naphthenic or intermediate types described in Refiner's Notebooks No. 8, September 16, 1944, page 117, and No. 13, October 14, 1944, page 113, but most oils of these bases do not contain much asphalt. As well as containing asphalt these crudes are usually characterized by:

1. Low gravity.
2. Much brine.
3. Little gasoline.
4. High sulfur.
5. Little wax or none.

These characteristics are illustrated by the analyses presented in the accompanying table.

Processing.—Fig. 1 utilizes the symbols of Refiner's Notebook No. 21, of December 9, 1944. Brine sometimes to the amount of 40 per cent of the crude oil must be separated. Refer to Refiner's Notebooks Nos. 29 and 30 on crude-oil settling. In cold climates, tanks, transfer lines, etc., as well as the asphalt system must be kept warm with steam. The atmospheric pressure or topping part of the flow is definitely secondary in importance to the reducing or vaccum distillation system. Many oils are so deficient in gasoline that no topping plant is required. Nevertheless, even small amounts of gasoline will hamper the production of a vacuum in barometic condenser and steam-jet equipment.

If the crude oil contains wax, the vacuum-still distillates are sent to a cracking plant. The asphalt residue may be blended with gas oil or distillate for the manufacture of road oil or railroad fuel oil. If the raw vacuum stocks have pour points under 20° or 30° F., the manufacture of naphthenic lubricating oils may be feasible. Pour-point depressants are usually highly effective. These oils have a poor viscosity index but they have the highly valuable property of keeping the engine clean (detergency). The color of the oils is improved by the use of caustic soda in the vacuum-distillation system and the final color is usually attained by acid treating and clay contacting.

Source—	A.P.I.	Per cent S.	Per cent gasoline & naphtha	Per cent asphalt	Base	Wax
Byron, Wyo.	24.1	2.52	14.4	43.1	Intermediate	Yes
Frannie, Wyo	17.5	3.14	3.0	49.8	Inter.-Naph.	Yes
Garland, Wyo.	20.5	3.03	12.7	42.2	Inter.-Naph.	Yes
Grass Creek, Wyo.	24.8	2.67	18.0	39.5	Intermediate	Yes
Irma, Ark.	15.3	2.54	2.4	57.9	Naph.-Inter.	No
Kern River, Calif.	13.9	0.93	0	56.5	Naphthene	No
Maverick Spg., Wyo.	21.8	2.88	8.0	43.5	Intermediate	Yes
Oregon Basin, Wyo.	21.3	3.37	15.8	44.4	Naph.-Inter	Yes
Poison Spider, Wyo.	20.8	3.10	13.5	40.2	Inter.-Naph.	Yes
Smackover, Ark.	19.8	2.32	10.0	47.5	Naph.-Inter.	No
Tampico, Mexico	11.1	5.15	6.0	56.0	Naphthene	No
Urbana, Ark.	18.6	2.01	5.5	50.5	Inter.-Naph.	Yes
Vermilion, Canada	12.9	2.26	0	47.3	Naphthene	No

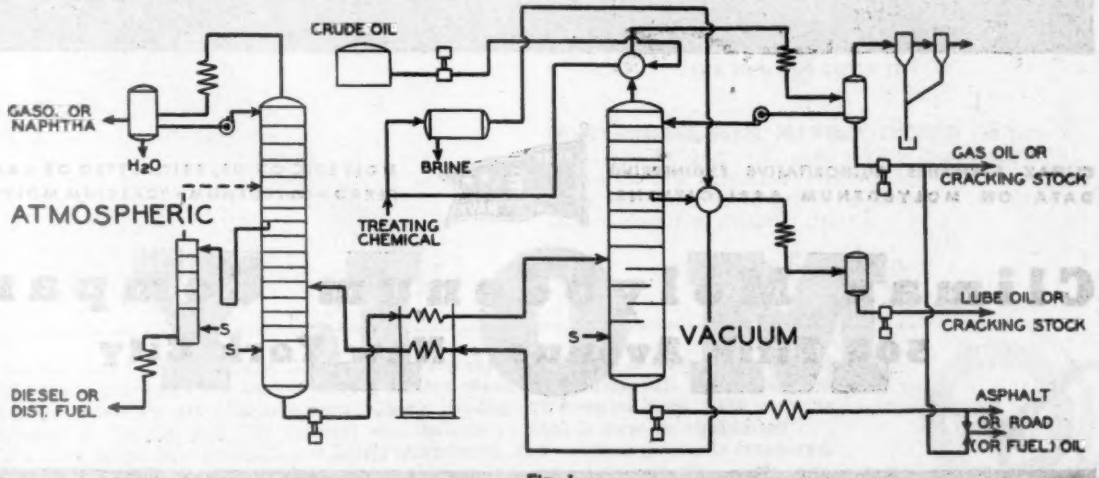
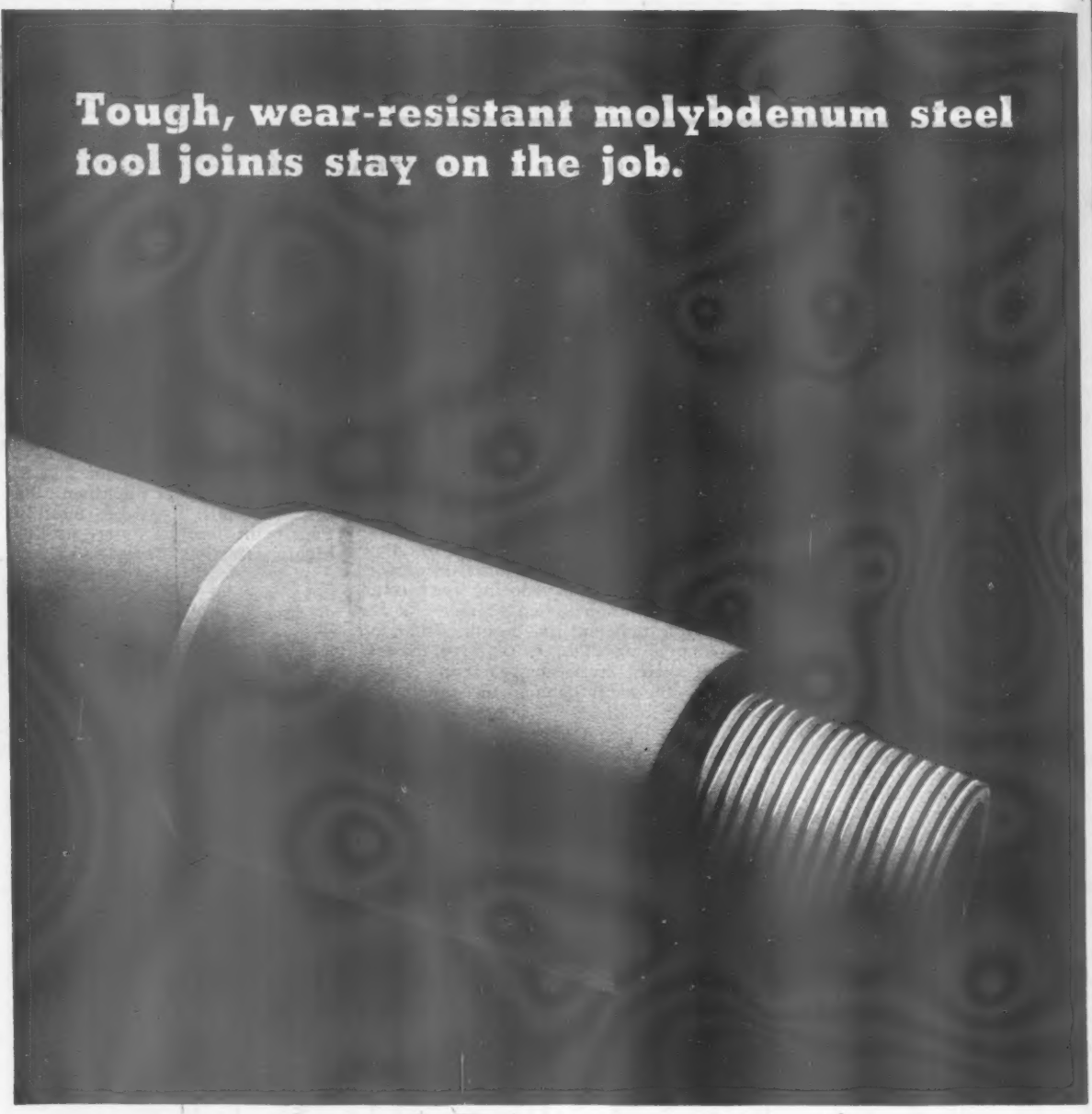


Fig. 1

No. 28 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

Tough, wear-resistant molybdenum steel tool joints stay on the job.



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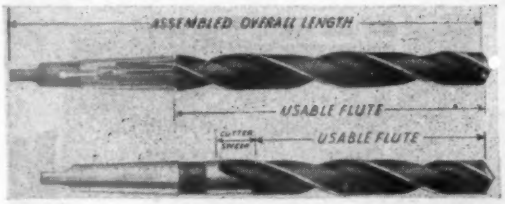
OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

by Kenneth [illegible]. Barnes

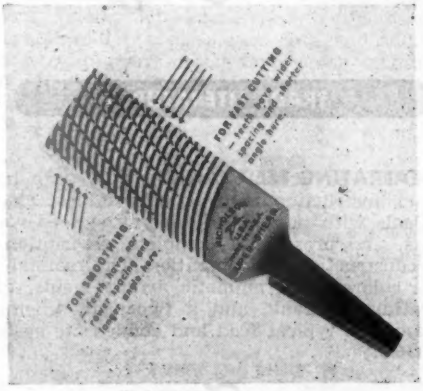
(1) SHANKLESS HIGH-SPEED DRILLS made with a continuous flute, and produced by roll forging and hot twisting, are a new development in machine-tool efficiency and economy. The drill itself is held by a hardened and ground collet-action "Drill Driver." Principal advantages of the shankless drill are said to be the substantially lower



cost, "shock absorber" neck feature which reduces breakage, greater length of usable flute, and greater strength and resistance to margin wear. The forging and twisting processes used in manufacturing are reported to produce a structure and "grain" in the flute of the drill that improve the service life. *Republic Drill & Tool Co., Chicago, Ill.*

IT'S NEW CHECK IT

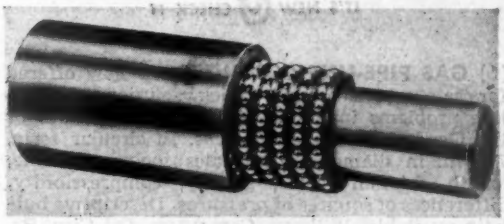
(2) SUPER-SHEAR FILE is a new type milled curved-tooth file reported to combine the functions of fast stock removal and smooth finishing in one



operation. The arcs of the file are off center in relation to the axis. This permits the teeth to begin with wide gullets and a right angle for fast cutting. However, these teeth become shorter and closer together as they terminate in a long shearing angle—for producing the shearing effect. Longitudinal serrations serve to break up the filings and assist the file to clear itself of chips. These serrations also serve to overcome "chatter" and the tendency of a file to run off the line of work. *Nicholson File Co., Providence, R. I.*

IT'S NEW CHECK IT

(3) HIGH-CAPACITY BALL BEARING employs a helix to separate and retain the balls, thus permitting the use of approximately twice as many balls as in the conventional sleeve-type retainer. The bearing is designed for applications where ball bearing antifriction qualities are desired in



rotation, reciprocation, oscillation, or combinations thereof. Bulletin 105 covers new list of recommended sizes, operating capacities per row of balls, other pertinent engineering data. *The Torrington Co., South Bend, Ind.*

IT'S NEW CHECK IT

(4) STAINLESS-STEEL FLEXIBLE TUBING is now available in 6-in. i.d. size, which increases the range of this corrosion-resistant, liquid and gas-tight line in sizes from ⅛ to 6-in. i.d. *Chicago Metal Hose Co., Chicago, Ill.*

IT'S NEW CHECK IT

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

(5) AUTOMATIC DRILLING-TIME RECORDER provides continuous chart of rate of penetration of rotary wells in terms of minutes per foot. Both drilling and coring operations are handled. Chart

space is provided for notations by driller, geologist, and engineer, regarding weight used, mud valves, formation, etc. The record made includes time for trips, connections, shutdowns. *The Geolograph Co., Oklahoma City, Okla.*

IT'S NEW CHECK IT

(6) GAS PIPE-LINE COMPUTER is now offered for sale which permits quick solution of pipeline problems involving either the Weymouth or the General pipe-line formulas. In circular form, 7½ in. in diameter, the scales include volume, length, friction factor, gravity, compressibility, differences of squares of pressures. Descriptive bulletin available. *Willsonn Computers, Oil City, Pa.*

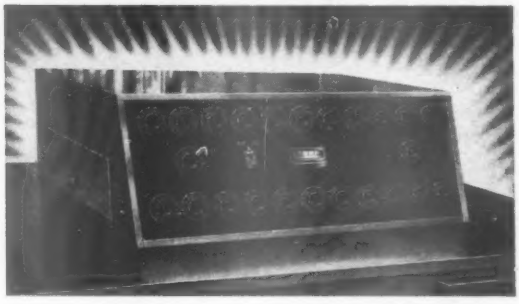
IT'S NEW CHECK IT

(7) ALL METAL SEALED CASING AND TUBING HEADS, stressing A.P.I. flanges and A.P.I. iron ring seal position. Now being manufactured at the new Fort Worth plant, where testing equipment for christmas-tree assemblies up to 15,000 lb. is maintained. Literature available. *Rector Well Equipment Co., Inc.*

IT'S NEW CHECK IT

(8) SPECTRO-COMPUTER. The Spectro-Computer is an instrument developed by Phillips Petroleum Laboratories for infrared analysis and mass spectrometry. The computer is used for solving the simultaneous equations encountered in spectroscopic analysis and is manufactured in two sizes, one capable of solving 7 unknowns and one capable of solving a maximum of 11 unknowns.

The solution of such equations when performed



mathematically requires many hours of time from highly trained engineers, yet by use of the spectrometer, operated by nontechnical laboratory help, routine equations are solved in 5 minutes and the most complicated in a maximum of 15 minutes. Control methods in manufacture of butadiene and aviation gasoline are speeded up and technical man hours required in laboratory control are drastically reduced. *Engineering Laboratories, Inc., Tulsa, Okla.*

IT'S NEW CHECK IT

TRADE LITERATURE

(9) DEAERATING FEED TANKS, a 30-page hand book or instruction manual with tables, charts, etc. Deals with purpose of deaerating feed-water heaters, and presents a complete description of their construction and operation. The manual includes colored diagrammatic arrangements, of a deaerating feed tank, and a two-page schematic diagram of a typical feed and condensate system. *Elliott Co.*

IT'S NEW CHECK IT

(10) REMOVAL OF PARAFFIN DEPOSITS, a 20-page booklet on application of paraffin solvents to oil wells. Actually, an operating man's handbook on the subject. Concise, complete. *Dowell Incorporated.*

IT'S NEW CHECK IT

OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

(11) GLASS-LINED PIPE AND FITTINGS, offered in complete range of sizes, to complete protection afforded by acid-resisting glass-lined steel process equipment against corrosion and metallic impurities. Described in well-illustrated folder. *The Pfaudler Co.*

IT'S NEW CHECK IT

(12) HIGH-PRESSURE GLASS-LINED STEEL REACTORS, one-piece jacketed closed construction; available in 350 to 2,000-gal. capacity. Permitting internal pressures up to 125 p.s.i., such glass-lined reactors allow faster reactions and higher yields. Bulletin gives construction and operating data. *The Pfaudler Co.*

IT'S NEW CHECK IT

(13) HYDROLEASE, a new clutch operation applying smooth-functioning control of hydraulics to heavy-duty clutches. Applicable on such industrial clutch applications as power winches, hoists, drag lines, etc. *Pesco Products Co., division of Borg-Warner.*

IT'S NEW CHECK IT

(14) V-BELT DRIVE HANDBOOK, a 384-page encyclopedia on the subject. Lists drive combinations for quick, easy selection; lists speed-up and speed-reduction drives; gives complete engineering data with tables and graphs on V-belt horsepower ratings and belt speeds; tells how to design fixed-center drives, quarter-turn drives; indexed by sections and subjects to enable rapid usage. *The Dayton Rubber Manufacturing Co.*

IT'S NEW CHECK IT

(15) FLUID-HANDLING EQUIPMENT, a new catalog featuring complete line of suction and pressure line strainers, duplex or vertical chamber-type strainers; "Y" strainers, angle-type strainers, interceptors for grease, wax, fats, and solids, together with many other devices for maintaining continual flow through the pipe lines of industrial and processes industries. *J. A. Zurn Mfg. Co.*

IT'S NEW CHECK IT

(16) ELECTRIC WELDED TUBING, a profusely illustrated brochure containing specifications for various tubing applications, and providing a complete handbook of engineering data on the subject. *Formed Steel Tube Institute.*

IT'S NEW CHECK IT

(17) HORIZONTAL SIMPLEX DIRECT-ACTING PISTON PUMPS, for handling highly volatile liquids at high volumetric efficiencies. Useful folder available, containing cutaway drawings, specifications, features, etc. *Worthington Pump & Machinery Corp.*

IT'S NEW CHECK IT

(18) CARBON AND GRAPHITE PRODUCTS, a booklet containing many charts and tables covering the physical and chemical properties of these products as applied to chemical or process industries, together with application and operational data on these products. *National Carbon Co., Inc.*

IT'S NEW CHECK IT

(19) CHEMICAL MATERIALS FOR INDUSTRY, a highly informative booklet on the cellulose family, rosins, rosin esters, synthetic resins, terpene solvents, explosives, and special products. *Hercules Powder Co.*

IT'S NEW CHECK IT

(20) CONDENSER-TUBE INLETS, for protection against erosion. Short belled-end metal inserts, which because of their peculiar shape, create a venturi action that reduces fluid friction by over 80 per cent, and correspondingly less power is required to pump circulating water. Also, by directing a smooth flow of fluid, these inserts are designed to prevent release of gases which cause pinholes in the tubes. Described in new bulletin. *Condenser Service & Engineering Co., Inc.*

IT'S NEW CHECK IT

(21) WEIGHT TABLES, for round seamless steel tubing. Complete tabular data (in convenient notebook form) for calculating average and minimum wall weight of round seamless steel tubing. *Michigan Seamless Tube Co.*

IT'S NEW CHECK IT

(22) STORAGE AND PROTECTION OF VOLATILE PRODUCTS, a booklet packed with engineering data, drawings, photographs, on the subject. Exhaustive discussion on evaporation losses from volatile products. *Graver Tank & Mfg. Co., Inc.*

IT'S NEW CHECK IT

(23) HERCULES AND THE WAR, by Lowell Thomas. A beautifully prepared booklet, describing another accomplishment by American industry in the present war effort. *Hercules Motors Corp.*

IT'S NEW CHECK IT

(24) HEAT TREATMENT OF STAINLESS STEELS. A new 56-page booklet includes glossary of terms, special section on trouble shooting in heat treating stainless steels, a section on hardness testing, and much other supplementary engineering data. *Metal Goods Corp.*

IT'S NEW CHECK IT

MEN IN THE NEWS

D. O. Pugh has been appointed sales and service representative of the oil-tool division of Byron Jackson Co. of Los Angeles, for the Oklahoma-Kansas district, with headquarters in Tulsa. Pugh has been with Byron Jackson for 20 years and recently has been serving as representative in Oklahoma. District sales offices will be established at 310 Thompson Building, in connection with the company's pump division.

Elmer R. Smith was recently elected president of the Los Angeles chapter of Nomads. Other officers elected were William McGraw, vice president; J. V. Robinson, secretary; Fred Tyler, treasurer; H. E. Cassidy, sergeant at arms; C. M. Byron, assistant secretary; Waldo Moore, assistant treasurer; Custer Morrow, deputy sergeant at arms, and Henry Pullman and Roland E. Smoth, regents.

Allan K. Cook has been appointed exclusive sales and engineering representative for Fisher Governor Co. in western Kentucky and southern Indiana. He has established offices in the McDowell Building, 505 South Third Street, Louisville, Ky.

Herbert Hoover, Jr., president of United Geophysical Co., Inc., and A. A. Curtice, of Caracas, Venezuela, vice president of United Engineering Co., S.A., were the principal speakers at the fifth annual dinner of the Tulsa chapter of Nomads held January 24 at the Tulsa Club. Two hundred members and guests attended the dinner. In off-the-record talks the speakers discussed "Petroleum in the Middle East." George W. (Jack) Walton, retiring president of the Tulsa Nomads, presided at the dinner, and Paul E. Fitzgerald, a member of the board of regents, was toastmaster.

Dr. Zay Jeffries, technical director of the lamp department of General Electric Co., has been elected vice president in charge of a new department of General Electric, to be known as the chemical department. The department will assume responsibility for the operations pertaining to the resin and insulating-materials division and the plastics division of the appliance and merchandise department.

William Skakel has been named by Republic Supply Co. as manager of a new sales office the company has established at 312 Pure Oil Building, 35 East Wacker Drive, Chicago, Ill.

Frank P. Rhame has been made general manager of The Lunkenheimer Co., valve manufacturers, Cincinnati, Ohio, succeeding Charles A. Brown, who recently retired. Homer E. Lunken, a director, succeeds Rhame as assistant general manager. Carra L. Lane has been named works manager, succeeding George A. Snyder, who has also retired. Fred H. Heheman becomes chief engineer, succeeding Jerome J. Aull, retired.

Elmer J. Weis, vice president, Pacific Pumps, Inc., (second from left) with two Anglo-Iranian officials at his left, and a Persian foreman at his right

Elmer Weis, vice president of Pacific Pumps, Inc., Huntington Park, Los Angeles, Calif., recently returned from a "service call" which took him the equivalent of one and one-half times around the world. At Anglo-Iranian Oil Co.'s refinery at Abadan, Iran, Weis supervised the overhaul of Pacific pumps which has been in continuous service since 1927. Wells each producing as high as 80,000 bbl. per day, at surface pressures up to 600 lb., supply the refinery. Concentrating on fuel-oil production, the refinery was pumping back into the wells, 400 miles away, 2,000,000 gal. of gasoline daily. Weis lived in the refinery about 2 weeks, then came home via R.A.F. planes and flying boats by way of North Africa and London.

INDUSTRIAL ITEMS

Thermoid Co., Trenton, N. J., has announced plans to purchase Grizzly Manufacturing Co.'s West Coast plant and equipment at Los Angeles, Calif. The purchase will include the complete line of oil-field, industrial-rubber, and aviation products, including inventories and accounts receivable. The Grizzly trade-mark will be continued, and Walter Smith, president and general manager of Grizzly, will continue as manager of the plant.

The Columbia Chemical Division of Pittsburgh Plate Glass Co. has acquired the plant and sales organization of Pacific Alkali Co., Bartlett, Calif., manufacturers of soda ash, borax, sesqui carbonate of soda and other products.

The Linde Air Products Co., in cooperation with Pressure Weld Co., Houston, Tex., is conducting a training course in pressure welding overland pipe lines. The school is being held at the plant of the latter company, under the direction of H. A. Yost.

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Natural Gas

Railroad Commission Sits With FPC at Hearing

WASHINGTON.—Members of Texas Railroad Commission sat as a joint board with Federal Power Commission here January 29 at the hearing on the application of Reynosa Pipe Line Co. for authorization to export natural gas from Texas to Mexico, Reynosa seeks permission to construct a pipe line from La Blanca field to Monterrey, Mexico, for the delivery of a maximum of 60,000,000 cu. ft. of gas daily.

Tennessee Gas & Transmission Co. has withdrawn its application to construct feeder lines in Texas, the Railroad Commission was advised by FPC.

Gas-Conservation Problem Faces Texas Legislature

AUSTIN.—Conservation of this state's vast natural-gas resources poses a difficult problem for the current session of the Texas Legislature. Recent testimony before the Texas Railroad Commission at hearings on this subject shows that technical authorities hold divergent views. This was illustrated when the commission ordered Chicago Corp. and others in the Stratton-Agua Dulce area near Corpus Christi to return dry gas to the reservoirs after taking out liquids in cycling plants.

Chemical and petroleum engineers agreed that in some fields the pressure-maintenance order might be satisfactory, but on the particular sands in question they disagreed as to whether more hydrocarbons would be obtained through cycling or through straight production.

Gov. Coke Stevenson mentioned the complicated nature of the gas problem in his message to the legislature and remarked upon conflicting information which is available regarding reserves.

Two specific moves are being made regarding natural gas, however. A committee of engineers, headed by William Murray, of Houston, will study the problem of casinghead gas which is wasted in production of oil, to see how much gas is available and what can be done with it. Rep. Howard Hartzog, of Port Lavaca, is preparing a bill which would require oil operators within 10 miles of a gas line to deliver casinghead gas under pressure to the pipe line, if it is now being wasted. The line in turn would be required to take this gas before it draws from its own reserves.

Submission of testimony before the State Railroad Commission on gas conservation in the Stratton-Agua Dulce area has been completed, and the commission set February 19 as the deadline for filing final briefs.

Walnut Valley Pipe Line Bought by Gas Service

KANSAS CITY.—The Gas Service Co. has acquired Walnut Valley Pipe Line Co., which serves domestic and industrial customers in the suburban district northeast and northwest of Arkansas City, Kans. Gas Service already has begun serving this territory after making a tie-in at the Arkansas City Northtown Border station. The Walnut Valley property was owned and operated by Herman Goff, who built the system in 1929. For years customers were supplied with gas from the immediate vicinity of the line.

Repressuring Operations Begun in Turner Valley

CALGARY, Alta.—British-American Oil Co. has commenced operation of its repressuring plant in South Turner Valley. Low-pressure gas is being gathered from the southern part of the field, processed, and either marketed for fuel or returned to the formations.

Valve Recommendations Put in Pamphlet Form

WASHINGTON.—Printed copies of Simplified Practice Recommendation R205-44, Iron and Steel Relief Valves for Petroleum, Chemical and General Industrial Services, are now available, according to an announcement of the Division of Simplified Practice, National Bureau of Standards.

The valves covered by this recommendation are primarily intended for air, gas, vapor and liquid service requirements for natural gasoline plants, oil refineries, synthetic-rubber projects, and chemical plants.

The Petroleum Administration for War is the principal claimant agency for the relief valves found in the proposed recommendation and representatives of the Materials Division, formerly the Construction Division, of that office collaborated in drafting the simplified list of sizes and varieties.

Copies of the report may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D.C., for 5 cents each.

Cycling

Chicago Corp. to Build Carthage Field Plant

DALLAS.—Construction of a cycling plant in the Carthage gas field, Panola County, East Texas, capable of processing 150,000,000 cu. ft. per day with a supporting development and pipe-line program, was reported here last week. The program has been launched by the Chicago Corp., Corpus Christi, parent company of the Tennessee Gas & Transmission Co., with announcement that 10 wells will be drilled promptly on approximately 18,000 acres of newly acquired leases.

Chicago Corp.'s plant is the second projected for the Carthage field. Previously, Rogers Lacy, Longview, announced plans for construction of a cycling plant with residue gas contracted to Lone Star Gas Co. Arkansas Louisiana Gas Co., subsidiary of Cities Service, is operating a natural-gasoline plant with a daily capacity of 25,000,000 cu. ft. Reports on the Chicago Corp. program did not include information on plans for marketing gas from the operation.

More than $3,000,000 was paid by Chicago Corp. for a three-fourth working interest in 18,000 acres, two producing wells and one test preparing to start drilling operations. The purchase was made from Norman V. Kinsey and W. C. Feazel of Monroe and Shreveport, La. The partners retain approximately 11,000 acres which will be developed.

Location for the cycling plant is a 52-acre tract in the northwest corner of the Moorman Survey, 2 miles west of Carthage.

Under Petroleum Administration for War regulations which limit development in gas fields to one well per 640 acres the Carthage gas field has become one of Texas' largest reservoirs. Preliminary plans have been discussed with PAW officials for installation of a Fischer-Tropsch operation which would mark the first commercial installation of this type for synthetic production of liquid petroleum products from natural gas.

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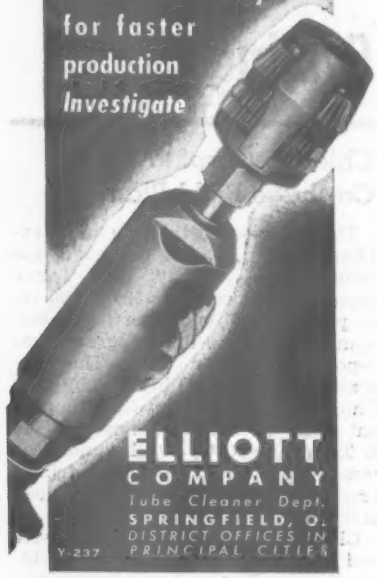

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REFINING

General Petroleum to Build Wyoming Plant

DENVER. — General Petroleum Corp. is reported to have taken over the site and installations at the Taylor Oil Co. projected refinery at Cowley, Wyo., and is preparing to erect a skimming plant and loading racks to handle its crude production from Garland field. Several years ago W. O. Taylor, head of the Taylor Oil Co., started a refinery at Cowley which was intended to have a capacity of 1,500 to 2,500 bbl. per day. Some buildings were erected, boilers were in place and railroad facilities were built when work was suspended. Taylor had developed black-oil production on his lease at Garland at the time but the market for that type of crude was very limited. Recently he sold his Garland leases.

Kemmerer, Wyo., Wants Synthetic-Fuel Plant

WASHINGTON. — Installation of an experimental synthetic-fuel plant at Kemmerer, Wyo., has been recommended to Bureau of Mines officials by a delegation from that town. The group, headed by Dr. A. C. Crane, former president of University of Wyoming, turned over to Dr. R. R. Sayers, Bureau of Mines director, data concerning coal deposits in the Kemmerer region from which gasoline could be made.

Texas Ruling May Exclude Cooperative Refineries

AUSTIN. — Cooperative refineries and other oil operations, which have assumed an important place in various middle western states, may be barred from Texas as a result of a ruling issued by the office of the attorney general. Under the ruling farm cooperative associations cannot engage in the oil business as farm cooperatives and still retain the advantages which accrue to them in Texas and other states as well as under federal statutes.

Chief among these advantages is exemption from income and other tax measures. The Texas ruling says farm cooperatives are specifically prohibited by the statute which authorizes that form of enterprise from engaging in any activity other than is specifically set out in the statute.

Despite the fact that the charters of such cooperatives permit them to engage in such activities, they cannot so engage in Texas, the attorney general holds.

In some states these cooperatives have gained impressive positions in the oil industry as refiners, producers and distributors of oil products. They have entered the pipe-line branch of the industry also.

Mexico May Turn to This Country for Gasoline

MEXICO CITY.—Petroleos Mexicanos, Mexico's government oil monopoly, contemplates asking the United States for gasoline while it builds up a distribution system to break the black market.

President Avila Camacho ordered Pemex to hasten action because northern industry, particularly around Monterrey, is suffering from a shortage and the tourist trade is injured. Gasoline sells normally at 18 cents a gallon, but tourists have been obliged to pay 80 cents and often have been delayed.

Pemex says it has gasoline, but that rail distribution and shortage of tank cars and storage facilities pre-

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This double-safety lantern has a tamper-proof reflector and cover with locking device and seals. Throws 1500 ft. beam. Instantly ejects broken bulbs from battery circuit. Large handle — 360° pivoting feature gives direct illumination where needed and leaves both hands free for work.

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vent it from regularly supplying all parts of the country. Last fall, after the breakage of a pipe line, Mexico City was rationed for several weeks.

Louis Rose Refining Co. to Install New Facilities

Louis Rose Refining Co. of Saginaw, Mich., is planning a $150,000 addition to its plant. The project, which will nearly triple capacity to 4,000 bbl. a day, includes a new cracking unit and facilities for high-octane gasoline production.

Large Refinery on Persian Gulf Nearing Completion

CAIRO.—Arabian American Oil Co.'s refinery on the Persian Gulf, at Ras-Tanurah, is nearing completion. An affiliated company's refinery on Bahrein Island is undergoing improvement and expansion, and a pipe line is being laid to transport crude from the Arabian mainland to the plant.

British and American oil interests are gradually developing their properties in the middle eastern area. The British are seeking to obtain American steel to double the capacity of the pipe line leading from fields in northern Iraq to Haifa on the Mediterranean seacoast.

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Accidents at Sun Refinery Reduced 16 Per Cent

PHILADELPHIA.—A drop of 16 per cent in the accident rate at Sun Oil Co.'s refinery at Marcus Hook, Pa., has been recorded since a safety campaign was launched last June. This improvement was accomplished in the face of an increase of 1,382,063 hours worked at the plant during the second half of 1944 as compared with the first half, an increase of 29 per cent in hours of exposure.

Making the record more striking is the fact that during the campaign 1,871 employes were added at the plant and 1,456 were removed, many for induction into the armed forces.

Arthur E. Pew, Jr., vice president in charge of manufacturing, said the safety campaign would be continued through 1945. More than a billion gallons of high-octane gasoline have been made at the Marcus Hook refinery since Pearl Harbor.

Share-Crude Order Sent To 13 District 2 Refiners

CHICAGO.—Directives have been sent to 13 refiners in District 2 (Middle West) by Petroleum Administration for War, ordering them to share a total of 16,500 bbl. of crude oil daily throughout February with 18 other refiners in the district. This is the same number of supplying companies as in January, but a drop of 7 in the number of beneficiaries and a decrease of 2,650 bbl. in the daily quantity of crude to be shared.

The program is under the direction of the crude supply panel of the district refining committee, operating under a government-industry program to help alleviate the crude shortage.

Bill Proposes Diversion of Liquid-Fuel Tax to Roads

COLUMBUS.—A measure submitted to the Ohio House of Representatives would divert the 1-cent liquid-fuel tax, which now goes into the state's general-revenue fund, to the state highway department, half for highway maintenance and half for new construction.

Kendall Employes Vote 148 to 110 Against Union

BRADFORD, Pa. — Employes of Kendall Refining Co. decided against having International Union of Operating Engineers as their collective bargaining agent by a vote of 148 to 110. The election, held January 12, was sponsored by National Labor Relations Board. Of the 298 workers eligible to vote, 40 cast no ballots.

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Liquid always shows black—empty space shows white. Preferred where the liquid level must be easily and positively visible, and when liquids are under high pressure or at high temperature. Made of alloy temperature resisting steel and are highest quality throughout. Liquid chamber made from solid block of steel to assure perfect alignment and rigidity. Conform with A.P.I.—A.S.M.E. requirements.
The "Reflex" is one of the complete line of Penberthy Gages that meet every liquid level gage requirement.

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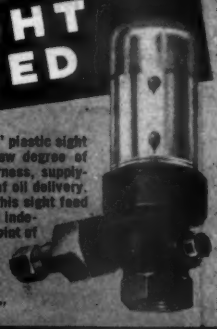
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PIPE LINES

Utah to Lay 90-Mile Rangely-Craig Line

Utah Oil Refining Co. has War Production Board approval to start construction this spring on a 90-mile 6-in. crude-oil line from the Rangely pool, Rio Blanco County to Craig, Moffat County, Colorado. Connection will be made with an existing line completed last year from Iles, Colo., to Wamsutter, Wyo., which feeds into the company's Fort Laramie, Wyo.-Salt Lake City, Utah, trunk line. The Rangely-Craig project will be built of new pipe and will have a capacity of 6,250 bbl. daily.

Pump stations will be constructed at Rangely and Craig as well as necessary equipment such as tankage and other appurtenances. The proposed project will eliminate the need for truck transportation in moving crude oil to the Utah company's refining facilities. Construction is expected to start in April with completion scheduled in July.

Interstate Awarded "T" Insignia by WFC

The War Finance Committee announced today that the Interstate Oil Pipe Line Co., formerly the Oklahoma Pipe Line Co., has exceeded the treasury department's pay roll savings goal and will be awarded the Minute Man flag with "T" insignia.

The flag is awarded companies where at least 90 per cent of employes are buying war bonds each month, and the "T" shows that more than 10 per cent of the total pay roll is being invested in bonds.

The company achieved the goal in spite of widely-scattered personnel operating over an area extending from Kentucky to Wyoming.

War bond letters from company officials, plus personal solicitation of all employes by supervisors, made possible the company record of 95 per cent participation with approximately 17 per cent of the total pay roll earmarked for bond purchases.

WEP 20-in. Transported 65,000,000 Bbl. in Year

In its first year of operation the War Emergency Pipelines, Inc., 20-in. system transported 65,000,000 bbl. of products. The first shipments, which consisted of unleaded gasoline, entered the line at Beaumont, Tex., January 25, 1944, and arrived at Linden, N. J., March 2, 1944.

In commenting on what had been accomplished in operating the little big-inch line, Petroleum Administrator for War, Harold L. Ickes, referred to it as "one of this country's most potent weapons of war aimed like a gigantic rifle at the heart of Germany."

Texas-New Mexico Enlarges Pump-Station Capacity

In the program of Texas-New Mexico Pipe Line Co. for increasing the capacity of its trunk line, work has been done in connection with the installation of an additional 200-hp. pumping unit at the Rosansky station. Delivery of equipment needed for station changes at other locations is expected by February 15.

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With
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Minimum COST

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Front view of Holan 2-ton Winch

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Write for Detail Information

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CLEVELAND 4, OHIO

Sufficient progress has been made in the laying of 30 miles of 12-in. loops to indicate that part of the increase in capacity will be available for use in February. However, all station work will not be finished until April.

Gulf Refining Co. has completed more than a third of the 63-mile 8-in. Keystone-Ellenburger to Midland, Tex., line which is expected to be in service in March.

Everett-Waltham Line Is Nearly Completed

Colonial Beacon Oil Co. is far enough advanced with the laying of the Everett-Waltham leg of its refined-product system to indicate that this leg will be completed early in February. Pipe is being laid for the Waltham - Dracut, Mass. leg. At Waltham the system connects with that of Shell Oil Co., Inc. Construction of the pump station at Everett is behind schedule because of a delay in receiving equipment.

Gas Line to Be Laid at McAllen

Construction of a new 6-in. natural gas line has been started by the municipal gas system to link the west McAllen, Tex., industrial district with the present source of gas.

The new line will replace a 2-in. line.

The line will lead to a new dehydration plant now nearing completion in the industrial area.

Bureau of Standards Tests Anode Metal in the Field

Experimental combinations of zinc and steel were buried at 8 field sites under the supervision of National Bureau of Standards in a program started in 1941, according to the bureau's Technical News Bulletin. The combinations were arranged so as to give different ratios of area of zinc to that of steel. During the last month some of the specimens from a site near Shreveport were returned to the bureau. Examination showed that a sample of steel not connected to the zinc lost from 40 to 50 times as much metal as similar samples connected to zinc anodes. These observations are preliminary and further measurements will be made in an effort to determine the best methods for using zinc in pipe protection. It may be found possible to replace the zinc by aluminum or magnesium in order to utilize such metals of which large quantities are likely to be available in normal times. Arrangements are being made to bury test sets of these metals during the coming spring.

Leonard to Lay Line in Michigan

Leonard Pipe Line Co., Mt. Pleasant, Mich., is ready to add to its facilities for bringing Isabella crude to refineries, having obtained War Production Board sanction for a $95,000 project providing for 15½ miles of 6-in. pipe and 2½ miles of 4-in. line.

Pipe-Line Course Is Planned

A course of oil pipe-line practices is being organized at the Greggtown, Tex., community building under the sponsorship of the American Petroleum Institute committee on vocational training and the state board for vocational training and Kilgore College.

Beginning with the history and study of pipe lines, the course will include a study of line pipe and fittings, construction and maintenance, soil corrosion and pipe protection; operation of pipe lines, oil tanks, strapping tanks, gaging tanks and pumping stations; maintenance of pumping station machinery; capacity of oil pipe lines, and communication systems used by pipe-line companies.

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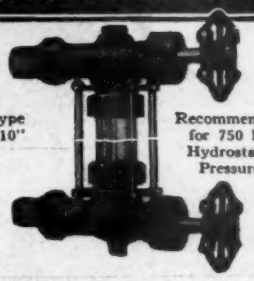

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Exploration and Drilling

Week's Highlights

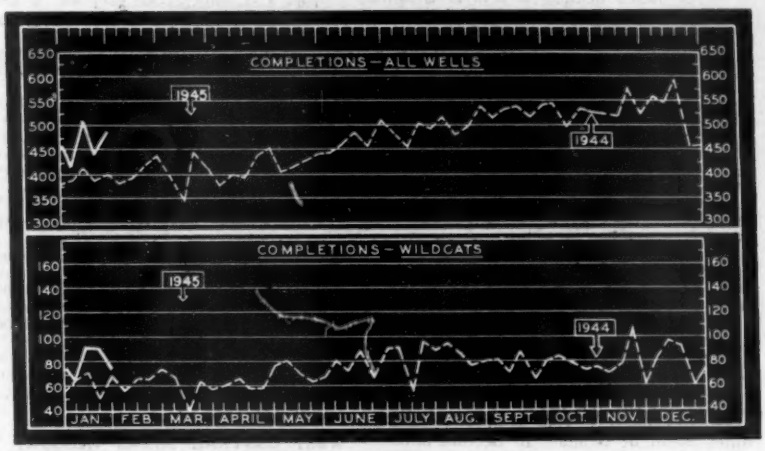
THE general picture around the recently discovered Delhi pool in Richland Parish, northeastern Louisiana, looks considerably different than it did when the discovery well came in. At that time, it was thought highly possible that a stratigraphic trap had been found.

This reasoning was natural as the well was located on the east flank of the igneous uplift that underlies the Monroe and Richland gas fields. In this area, below the gas rock that was deposited uniformly across the uplifts, the formations lap and overlap against the flanks of the igneous uplift. This created a condition in which all kinds of possibilities of wedging and pinchouts might be found.

This condition has not changed, and consequently no matter how the picture at Delhi finally develops, a strong play for stratigraphic traps will undoubtedly continue in this general area for some time to come. This will be due to the fact that since the Tuscaloosa has been found oil bearing in the area, even if the first oil was a structural accumulation, it may also produce in traps.

Right now the Delhi pool looks more like a structural accumulation than a stratigraphic trap. The discovery well was in the NW SE 21-17n-9e. A dry hole to the west and higher on the flank of the igneous uplift, found the Tuscaloosa some 20 ft. higher and full of salt water. That almost precludes the existence of a stratigraphic trap, since it would place salt water higher than the oil. It makes Delhi look more like a structural high, with a low to the west.

To the east, a direct offset to the discovery had a good drill-stem test with the sand reported 28 ft. higher than the discovery, although perhaps tighter. The second location directly east is reported to have cored good oil sand. To the northeast, a dry hole in NW SE 14-17n-9e, gives some control. To the southeast, in SW NW 26-17n-9e, is a well on which information is being withheld, but which may give considerable bearing on the possible trend. A string of 5½-in. pipe is being run at this location, giving rise to considerable speculation.



Solid line charts current weekly completions, service wells in Eastern area included

COMPLETIONS IN ALL FIELDS . . .

Week ended January 27, 1945

	Oil	Gas	Dry	Total	Footage	Total Comp. to date 1945	1944
N. Y., Penna., W. Va.	41	15	*43	99	153,117	383	231
Ohio	2	6	6	14	40,212	51	66
Indiana	3	0	7	10	23,818	17	27
Kentucky	4	0	5	9	15,071	26	51
Illinois	17	0	16	33	87,274	155	127
Michigan	7	1	6	14	41,597	57	37
Kansas	9	7	12	28	90,089	101	136
Nebraska, Missouri, Iowa	0	0	0	0	0	6	8
Oklahoma	26	5	13	44	182,960	178	94
Texas:							
North Central	20	0	21	41	127,354	149	76
West	27	0	8	35	245,797	122	104
Panhandle	2	19	1	22	69,298	40	9
Eastern	1	0	1	2	16,775	20	25
Gulf Coast	10	2	4	16	103,646	121	29
Southwest	1	0	7	8	33,909	45	69
Total Texas	61	21	42	124	596,779	497	312
Louisiana:							
Northern	2	2	4	8	25,186	23	19
Southern	10	1	4	15	147,518	48	25
Total Louisiana	12	3	8	23	172,704	71	44
Arkansas	1	0	1	2	6,487	14	14
Mississippi	4	0	2	6	40,438	22	13
Southeastern States	0	0	1	1	4,305	2	†
Montana	7	1	2	10	24,581	23	14
Wyoming	5	0	0	5	21,377	20	10
Colorado-Utah	0	0	0	0	0	4	2
New Mexico	7	0	1	8	35,399	38	23
California	48	1	11	60	248,156	192	137
Total United States	254	60	176	490	1,784,364	1,857	1,346
Total previous week	239	47	154	440			
Total Jan. 29, 1944	189	41	114	344			

*Includes 37 input wells. †Included in total shown for Mississippi.

N. CENTRAL TEXAS

Grayson Deep Test Continues Drilling

WICHITA FALLS. — Chief interest in North Texas continues to center on Pure Oil Co. 1 Little, Grayson County wildcat which has indicated Ordovician production between 8,930-9,200 ft. but has not yet halted drilling to test. It is now below 9,401 ft. in lime and dolomite, with an 11,000-ft. string of 5-in. casing on location.

Jack County.—James Stewart & Co., Inc. 1-D J. W. Kinder, a wildcat in the northwest corner of B. H. Epperson Survey A-208, 7 miles south of Bryson, had lime showing oil and gas at 3,913-17 ft. The hole filled with oil from lime pay at 4,204-25 ft., making small heads while drilling ahead with cable tools to 4,652 ft., where operators cemented pipe for production test. A. R. Dillard 1 J. R. Marley, a wildcat 5 miles east of Bryson, recovered only a little clear drilling fluid on drill-stem test from 3,088-3,102 ft. in sand showing oil, and is dry at 3,434 ft.

Young County.—Maguire Industries, Inc. 1 M. Bernhardt, a wildcat 3 miles north of Jean in Section 1,474, perforated casing at 4,373-4,403 ft., opposite Caddo lime, treated with 500 gal. acid and flowed 25 bbl. hourly on initial test. Calapor Manufacturing Co. 1 J. R. Jeffery, 4½ miles north of Graham in Section 3,408, topped Ellenburger at 4,940 ft., had broken lime showing oil at 4,960-71 ft., bailed 5 gal. oil every 2½ hours, then set liner at 4,963 ft. and is drilling out cement to test.

King County.—Ohio Oil Co. 2 Ross, offset to the company's recent Strawn lime flush discovery well, is drilling below 2,900 ft., with pay zone expected below 5,200 ft. Shamrock Oil & Gas Co. et al 2 Masterson is drilling at 6,129 ft. in shale and lime.

NORTH CENTRAL TEXAS WILDCAT COMPLETIONS

Archer County: F. L. Harvey 1 A. L. Harris, Blk. 58, J. W. Harris subd., 7 mi. W and 2 mi. S Archer City, elev. 1,094 ft., dry, TD 1,402 ft.

Rathke Oil Co. 1 A. L. Harris, Blk. 93, J. W. Harris subd., 5 mi. W and 2 mi. S Archer City, dry, TD 1,362 ft.

Clay County: Continental 1 Annie T. Morris, W. C. Davis Sur. A-119, 6 mi. S and 1 mi. W Jolly, elev. 885 ft., Caddo 5,402 ft., Simpson 5,652 ft., Ellenburger 5,752 ft., PB to 5,300 ft., perf. 4,754-74 ft., pumped 30 bbl. day, gravity 41°, TD 5,870 ft.

Texas 1 Leola P. Hapgood, Lot 84, Marion CSL Sur. A-308, 5½ mi. S and 8 mi. E. Henrietta, elev. 974 ft., dry, TD 7,202 ft.

Grayson County: Texas 1 J. R. Handy, Samuel Stewart Sur. A-1069, 1 mi. S Orlena, dry, TD 3,339 ft.

Jack County: Paul P. Steed et al 1 Nannie E. Ware, Sec. 3,350, TE&L Sur., 3 mi. E Jermyn, elev. 1,203 ft., Caddo 4,453 ft., 112 bbl. day through ¼-in. choke, gas-oil ratio 500 to 1, gravity 40°, TD 4,472 ft.

Throckmorton County: Bridwell Oil 1 Parrott, Sec. 976, TE&L Sur., 2 mi. N Woodson, dry, TD 2,000 ft.

Panhandle Refining 2 W. B. Ewalt, Sec. 2,185, TE&L Sur., 3 mi. W and 3½ mi. S Elbert, elev. 1,277 ft., Barnett 4,703 ft., Mississippi 4,715 ft., Ellenburger 5,002 ft., perf. 4,802-07 ft., pumped 50 bbl. day, TD 5,030 ft.

Young County: Fain-McGaha Oil 1 H. O. Prideaux, Sec. 2, A. Rohus Sur. A-240, 2 mi. N and W Markley, elev. 1,053 ft., dry, TD 4,522 ft.

WEST CENTRAL TEXAS WILDCAT COMPLETIONS

Jones County: T. D. Humphrey & Burton 1 L. H. Cullwell, Sec. 47, Deaf and Dumb Asylum lands, 6 mi. NE Anson, elev. 1,612 ft., Palo Pinto 3,659 ft., dry, TD 3,687 ft.

Taylor County: Geo-Chemical Surveys, Inc., et al 1 E. A. Click, Subd. 22, Grimes CSL Sur. 146, 3½ mi. SE Merkel, elev. 1,880 ft., Flippen 2,577 ft., dry, TD 2,710 ft.

Great Lake Carbon Corp. 1 Gruver & Simmons, W. M. Bishop Sur. 43, 4 mi. SW Abilene, elec. 1,782 ft., Flippen 2,016 ft., dry, TD 2,126 ft.

DAILY AVERAGE PRODUCTION FOR WEEK

	Jan. 27 crude oil	Distillate, allied products	February PAW quota all oils	Jan. 20 crude oil
Alabama	300	.....	300	250
Arkansas	81,300	5,200	85,200	81,700
California	895,250	58,000	951,800	887,750
Colorado	8,900	.....	9,500	8,800
Eastern	63,000	8,700	76,900	62,100
Illinois	209,700	12,000	210,000	198,600
Indiana	12,600	.....	12,000	12,600
Kansas	267,200	5,000	279,000	276,550
Kentucky	29,400	3,800	35,800	30,400
Louisiana	357,200	37,000	397,000	358,200
North Louisiana	68,000	.....	.....	69,000
South Louisiana	289,200	.....	.....	289,200
Michigan	46,700	850	47,850	42,550
Mississippi	48,850	.....	53,000	47,600
Montana	22,600	300	23,300	22,300
Nebraska	950	.....	1,000	1,000
New Mexico	103,000	5,100	110,100	103,150
Oklahoma	361,900	26,500	388,500	362,500
Texas	2,135,150	150,000	2,290,000	2,120,350
East Texas	385,700	.....	.....	370,900
East Central Texas	144,050	.....	.....	144,050
North Central Texas	143,150	.....	.....	143,150
Texas Panhandle	88,700	.....	.....	88,700
West Texas	478,600	.....	.....	478,600
South Central (S. A.)	20,050	.....	.....	20,050
South Texas (Laredo)	78,400	.....	.....	78,400
Lower Gulf Coast	243,900	.....	.....	243,900
Upper Gulf Coast	552,600	.....	.....	552,600
Wyoming	92,700	3,600	103,600	94,100
Total United States	4,736,700	318,050	5,074,850	4,710,800
Change from previous week	up 25,900			

Total production January 1-January 27, 1945 ..... 127,225,050 bbl.
Same period last year ..... 118,256,375 bbl.

PERMIAN BASIN

Howard-Glasscock Pool May Have Deeper Pay

MIDLAND.—Possibility of deep production in the old Howard-Glasscock shallow Permian area on the east side of the Permian basin furnished the week's chief development in West Texas. Continental Oil Co. D-1-133 W. R. Settles showed oil and gas in mud returns while drilling at 8,934 ft. and halted to thicken mud before coring or drilling ahead. At this depth it is believed in Pennsylvanian formation, probably the Crinoidal lime section. Located in Section 133, Block 29, W&NW Survey, in the middle of the Howard-Glasscock pool, it is contracted to 11,000 ft. or Ellenburger.

Continental Oil Co. 12 J. S. Todd, Todd Deep field, Crockett County, became the fourth well in that field to make prolific flow from Ellenburger pay. From perforations at 6,256-6,325 ft. it flowed 132 bbl. oil in 2 hours through ¾-in. choke, then sealed off Ellenburger and completed for 1,090 bbl. daily from the field's regular Crinoidal lime pay at 5,845-5,960 ft. It is on the east side of the field, in NW SW Section 28, Block WX.

Cascade Petroleum Co. 1-A H. C. Martin is a new Yoakum County test which may link the Ownby and the Waples-Platter pools. Spotted in NE NW, Section 555, Block D, it is ½ mile south of the Ownby pool and 1 mile northeast of a prospective ½-mile northeast extension to the Waples-Platter area. This latter test, Bay-Newfoundland Oil Co. 1 Corrigan-Ownby, is pumping about 25 bbl. oil daily, with some water, from total depth of 5,313 ft.

Definitely extending the Fort Stockton pool of Pecos County a mile southwest, The Texas Co. 1 Hart flowed 132 bbl. of oil in 24 hours after shooting with 120 qt. from 2,847-74 ft. Phillips Petroleum Co. 1 Ada Price, central Pecos County wildcat now plugged back to 11,591 ft., swabbed down to 10,000 ft. through tubing, then unloaded, showing a small amount of gas, with 600 lb. pressure on tubing after being shut in 12 hours. It continued swabbing.

Honolulu Oil Corp. 1-A-9 Hudson, Cochran County discovery 2½ miles southwest of nearest Slaughter field production, has been completed, pumping 111 bbl. of oil daily, no water, from pay between 5,046-5,120 ft. Union Oil Co. of California 6 Biles, ¾ mile north extension to the Union pool, Andrews County, is completed as a small pumper, making 50 bbl. daily from pay at 6,950-7,460 ft.

WEST TEXAS WILDCAT COMPLETIONS

Crane County: Gulf 6-E McKnight, Sec. 20, Blk. B-17, PSL, elev. 2,714 ft., McKee 6,702 ft., dry, TD 7,583 ft.

Dawson County: Richmond Drilling 1 J. W. Nelson et al, 1,980 ft. from N, 660 ft. from W lines, Sec. 34, Blk. M, ELRR Sur., 13½ mi. NW Lamesa, Yates 3,050 ft., lime 4,555 ft., PB 4,923 ft., top pay 4,805 ft., pumped 166 bbl. day through 2-in. tubing, gravity 33°, TD 5,003 ft.

Ector County: Stanolind 1-L Midland Farms, Sec. 36, Blk. 42, T-1-N, GMMB&A Sur., elev. 2,981 ft., Grayberg 4,580 ft., San Andres 4,810 ft., dry, TD 4,915 ft.

Gaines County: Shell 1 T. K. Sparks, Sec. 3, Blk. A-13, PSL, 12 mi. SW Seminole, elev. 3,422 ft., San Andres 4,490 ft., Devonian 9,960 ft., dry, TD 10,604 ft.

Howard County: Brown Bros. & Karcher 1-A Caldwell, Sec. 22, Blk. 32, T&P Sur., 18 mi. NW Big Spring, elev. 2,639 ft., dry, TD 2,251 ft.

Mitchell County: Magnolia 22 Mary Fos-

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ter, Sec. 17, Blk. 29, T-1-S, T&P Sur., elev. 2,289 ft., deep test in Iatan-E. Howard field, Ellenburger 8,415 ft., dry, TD 8,473 ft., PB to regular pay, IP 22 bbl. day.

Upton County: Standard of Texas 1 McElroy Ranch, Sec. 135, Blk. E, CCSD&RGNG Sur., 6 mi. E McElroy, elev. 2,863 ft., dry, TD 7,183 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Ohio Oil Co. 1 Jones, Lea County wildcat in 19-19s-39e, southeast of Hobbs, recovered 300 ft. of gas-cut mud with rainbow show of oil on 60-minute drill-stem test at 6,980-7,110 ft. and is drilling ahead at 7,149 ft. in lime. Atlantic Refining Co. 1 Stephens, 33-14s-33e, 12 miles southeast of Caprock, is drilling below 7,810 ft. in lime. Phillips Petroleum Co. 4 Lea-Mex, 17-17s-33e, western Lea County, is past 9,226 ft. in lime with no shows reported.

Samedan Oil Co. has staked a new 6,500-ft. test in NW SE 23-22s-37e, to explore Clear Fork lime found in Gulf Oil Corp.'s Drinkard discovery 2 miles to the east.

SOUTHEASTERN NEW MEXICO WILDCAT COMPLETIONS

Lea County: Humble 1 Federal-Leonard Oil Co., 660 ft. from S and W lines, 12-26s-27e, elev. 3,012 ft., Ordovician discovery, Silurian 9,854 ft., Montoya 10,264 ft., Ellenburger 11,820 ft., top pay 11,880 ft., IP 297 bbl. day through 5/32-in. choke on 2-in. tubing, gas-oil ratio 2,465 to 1, TD 11,969 ft.

TEXAS PANHANDLE

AMARILLO.—Panhandle wildcats report routine progress with no unusual developments. Humble Oil & Refining Co. 1 Hyslop, Deaf Smith County, is drilling ahead below 6,935 ft. after cementing 7-in. pipe at 6,744 ft. with 400 sacks. Stanolind Oil & Gas Co. et al 1 Lewis, Donley County, is drilling past 4,030 ft. in granite wash and red shale. In Sherman County, Humble 1 Pronger Bros. is drilling at 5,225 ft. in broken lime and shale.

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OKLAHOMA

New Pool Opened in Eastern Stephens County

A NEW pool has been opened in eastern Stephens County, between the old Robberson and Doyle pools, as Magnolia Petroleum Co. 1 Jones heirs, NW NE 21-1n-4w, swabbed 15 bbl. of clean oil per hour from a sand at 5,535-50 ft., still cleaning out. Pipe is set at 5,535 ft. and the well will probably be washed with acid.

Cleveland-Oklahoma counties. — Interest in closely watched wildcats still centers in this two-county area. The Phillips Petroleum-Keryln Oil Co. 1 Classen, NW SE 22-12n-4w, is still testing with reports indicating it is good for about 6,000,000 cu. ft. of gas daily and about 10 bbl. per hour of condensate, from Bois d'Arc-Hunton, perforated at 7,154-7,200 ft. Some geologists now claim, on the basis of gas and condensate production from true Bois d'Arc pay, that it must be separated from the West Edmond reservoir.

Kerlyn Oil Co. 1 Little, NE SW NW 29-11n-2w, east of the fault at the south end of the Oklahoma City field, had Sylvan at 7,035 ft., and is drilling at 7,045 ft. Gulf Oil Corp. 1 Beck, SW SW SW 15-14n-2w, east of the Northeast Edmond pool, is making 32 bbl. of oil, 2 bbl. of water and 225,000 cu. ft. of gas per day through a ½-in. tubing choke from Hunton at 5,824-49 ft.

O. G. Harp Poultry & Egg Co. 1 Matthesen, NE NW NE 19-10n12w, had top of Hunton at 7,904 ft. and is drilling below 7,910 ft. The Mississippi section thickened considerably compared to the West Moore wells. Gulf Oil Corp. et al 1 Price, NE SE 17-9n-3w, south of the West Moore pool, had Woodford at 8,470 ft. and is drilling below 8,500 ft. Magnolia Petroleum Co. 1 Anneler, SW NE 26-6n-1w, was dry in the Wilcox, total depth 7,035 ft., plugged back to 6,207 ft., perforated opposite Bartlesville sand at 6,075-83 ft., and bailed some oil. It is shut down to move in a new unit.

Garfield County.—Cities Service Oil Co. 1 Marriner, NW NE NW 6-22n-3w, between the old Garber field and the townsite, was deepened to 5,297 ft., in the Arbuckle lime and on 45-minute drill-stem test had 15 ft. of oil, 60 ft. of oil-cut mud and no water. Casing is to be set on top of Arbuckle at 5,247 ft. This test showed for a gas and condensate well in the Wilcox at 4,884-5,074 ft., and the company may attempt a dual completion.

Kiowa County.—The North Hobart pool, recently opened, has its second dry hole, with no additional successes since discovery. Pure Oil Co. 1 Boxley, SE SE SE 4-7n-17w, northwest of the discovery well, took drill-stem test at 1,959-96 ft. and had a scum of oil and 1,200 ft. of salt water.

OKLAHOMA WILDCAT COMPLETIONS

Caddo County: C. C. Lynch 1 Peterson, NE NE NE NW 3-5n-12w, flowed 33 bbl. of 36°-gravity oil in 16 hours through ½-in. tubing, TD 814 ft., new shallow discovery in Apache field. Conglomerate lime 795-814 ft.

Hughes County: Vulcan Oil & Gas 1 Harrell, SW SW NW 34-6n-10e, dry, TD 4,602 ft., Cromwell 4,414 ft.

Jefferson County: Bridwell 1 Seay, SE SW NE 20-6s-5w, dry, TD 2,343 ft.

Love County: Samedan & Stanolind 1 Harraway, SE SE NE 31-6s-3e, dry,

TD 4,700 ft., Overbrook sand 4,397 ft.

McIntosh County: Phillips 1 Bogarth, NE NE NW 12-12n-15e, dry, TD 3,575 ft., Viola 3,194 ft.

Marshall County: J. W. Baldwin 2 Smith-Thomas, SE SE NE 7-5s-5e, dry, TD 514 ft.

Murray County: Prunty Production 1 McClure, NE SE SE 13-1n-2e, dry, TD 2,508 ft., solid dolomite 2,388 ft.

MICHIGAN

Coldwater Field Gains Four Large Producers

SAGINAW.—Isabella County's expanding Coldwater oil field added four more heavy producers to its list of wells last week, their combined initial daily potential being about 3,500 bbl. Osceola and Missaukee fields reported one producer each and a small well was completed in Van Buren County. The completions list included six dry holes, one being a wildcat test, and one gas well.

Weather is restricting field operations, the week bringing only three new drilling permits from the state conservation department. They are for two tests in Mecosta County and one in Ogemaw County.

MICHIGAN WILDCAT COMPLETION

Isabella County, Coe Township: Don Rayburn-McClure-Basin Oil Co. 1 Bush, SW SE SE 25-13n-3w, dry in Monroe, TD 3,782 ft.

SOUTH LOUISIANA

Two Strikes Total 572 Bbl. Potential

NEW ORLEANS.—Atlantic Refining Co. 1-B Lutcher-Moore Lumber Co., in 33-10s-6e, new discovery in St. John Parish, flowed potential of 308 bbl. daily through ⅛-in. choke from 48 perforations at 10,254-86 ft., tubing pressure 2,750 lb., gravity 42.4°, 0.1 per cent water, gas-oil ratio 1,192. Total depth of this hole is 11,626 ft., with 7-in. casing set at 11,518 ft., and 2-in. at 10,218 ft.

Union Sulphur, Inc., 1 Medlenka, in 11-8s-2w, discovery well in the Iota area of Acadia Parish, flowed 264 bbl. per day through 14/64-in choke through 40 perforations at 9,664-76 ft., gravity 31.8°, gas-oil ratio 585. Total depth is 9,692 ft. with 7-in. casing set on bottom. This wildcat had sand showing oil at 9,380-90 ft. and 9,664-80 ft. Operator was not satisfied with this completion so killed and plugged back to 9,395 ft., perforated 9,380-90 ft. and well flowed into tanks at rate of 112 bbl. daily through ⅛-in. choke, tubing pressure 1,700 lb., gravity 32°, gas-oil ratio 424. Sand sections in this well are similar to those producing at West Tepetate in the Chickasawhay zone of the lower Miocene. Union Sulphur may try a dual completion.

Humble Oil & Refining Co. 1-C Wilberts Mineral Corp. et al, 77-8s-8e, at Bayou des Glaise in Iberville Parish, is completing in perforations 10,209-36 ft., with 2-in. set at 10,163 ft., flowing at the rate of 321 bbl. per day through 5/32-in. choke, 252,000 cu. ft. gas daily, tubing pressure 1,575 lb., gravity 36.5°, TD 10,581 ft., with 5½-in. set at 10,382 ft. This is a new deeper sand for this field.

Claude F. Morgan 1 Dimmick, 173-7s-4e, about 1½ miles north of Sun Oil Co.'s production at Shuteston field, St. Landry Parish, is completed as a gas-condensate well, no gage, and is shut in. Drilled to total depth of 10,414 ft., pipe was set for

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completion in perforations at 10,370-76 ft. Gas-condensate sand was reported at 10,290-380 ft.

Sun Oil Co. 3-B Boagni estate, 48-8s-4e, in North Cankton field, St. Landry Parish, was completed flowing a potential of 81 bbl. per day through ½-in. choke from perforations at 9,675-84 ft., gravity 37.4°, gas-oil ratio 728, tubing pressure about 500 lb., TD 10,250 ft. with 7-in. casing set on bottom.

SOUTH LOUISIANA WILDCAT COMPLETIONS

St. John the Baptist Parish: Atlantic Refining 1-B Lutcher-Moore Lumber Co., reserve area discovery, 33-10s-6e, TD 11,626 ft., 7-in. casing at 11,518 ft., perforations 10,254-66 ft., PT 308 bbl. day through ½-in. choke, gas-oil ratio 1,192, tubing pressure 2,750 lb., gravity 42.4°, 0.1 per cent water.

St. Martin Parish: Phillips 1 Bob, 28-8s-7e, dry at 11,194 ft.

EASTERN TEXAS

Pickton Pool Extension Test Is Checking Low

DALLAS.—Sun Oil Co. 1 Turner, Hopkins County wildcat over a mile northeast of Humble Oil & Refining Co.'s Pickton pool discovery well, had no shows in coring to 8,015 ft., at which depth it was checking about 70 ft. lower than the discovery, and coring ahead in shale and anhydrite. In Titus County, Humble Oil & Refining Co. 1 Searcy, south of Mt. Pleasant, recovered 14 ft. of sandy shale and anhydrite with no shows from 11,687-707 ft. and is drilling ahead at 11,782 ft. in shale, apparently still above top of the Smackover lime.

Smith County.—Phillips Petroleum Co. 1 Englander, South Tyler field, topped Travis Peak at 10,365 ft. and is drilling below 10,380 ft. in sand with show of gas. It ran electric log at 10,155 ft., with chart reportedly showing no porosity in the James lime member of the Rodessa section, in which the field's discovery well was completed. Phillips Petroleum Co. 1 Grelling, a wildcat 4½ miles southeast of the discovery, reported top of massive anhydrite at 9,256 ft., is drilling below 9,360 ft.

Falls County.—Cockburn Oil Corp. 1 fee, Smackover lime test northeast of Marlin, is shut down for repairs at 6,652 ft. in hard sand and shale. Electric-log survey of hole to this point indicated a slight kick in a couple of feet at top of the Cotton Valley section.

Camp County.—Gulf Oil Corp. 1 J. J. Pearson et al, Pittsburgh field test in the S. D. Thomas Survey, found only slight shows of oil and gas in drilling to total depth 8,183 ft. and is considered dry.

Rusk County.—Beacon Oil & Refining Co. 1 Bennett, Henderson field, has been completed for initial production of 137 bbl. daily through 5/32-in. choke from perforations at 7,292-98 ft., gas-oil ratio 3,515, gravity 41.5°.

Wood County.—Magnolia Petroleum Co. A-1 R. S. Harp is a new location for a Rodessa test on the northwest edge of the growing Winnsboro field, staked 1,160 ft. north and 660 ft. west of Hunt Oil Co. 1 Craddock, which was completed recently, flowing 253 bbl. daily from Rodessa pay at 8,164-88 ft.

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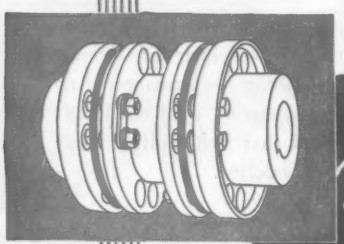

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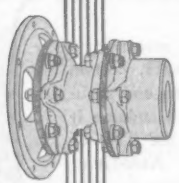

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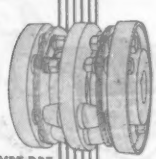

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ILLINOIS

New Willow Hill Pool Has Second Good Producer

CENTRALIA.—Pure Oil Co., which opened the Willow Hill pool in Jasper County in November 1944, with 1 Dhom-A, in SW SW SE 34-7n-10e, a 200-bbl. well, from McClosky lime, completed a bigger initial producer in the same pool, 1 Charles Miller, SW NW SE 34-7n-10e, north of the discovery well. It started at 319 bbl. per day from McClosky lime at 2,659-2,700 ft., at intervals, which had been acidized.

The Bennington pool in Edwards and Wayne counties, which has been yielding relatively large wells from lower O'Hara (Levias) lime and McClosky lime, came through with two more in the week in review. Burr Lambert 2 Nellie Van Schoick, SE NW NW 18-1n-10e, started at 350 bbl. per day from lower O'Hara at 3,220-34 ft., which had been acidized. It flowed through ¼-in. choke. Central Pipe Line Co. 1-V Blood, NW SW SE 7-1n-10e, flowed 410 bbl. per day through ½-in. choke from McClosky lime at 3,226-40 ft., at intervals, which had been acidized.

A better-than-average well for the Coles County area was Keating Drilling Co. 7 Uphoff, SW NW NW 25-12n-7e, Mattoon pool. It produced 120 bbl. initially from Aux Vases sand at 1,987-99 ft., which had been shot. Seven oil wells completed in December in this pool ranged from 7 bbl. to 47 bbl. initially.

Magnolia Petroleum Co. got a 300-bbl. well in the Woodlawn pool in Jefferson County in 1 Eubanks, SW NW NW 1-3s-1e, in Aux Vases sand shot at 1,976-86 ft.

In the Roland pool in White County Carter Oil Co. 2 Conge, NE SE NW 2-7s-8e, was good for 225 bbl. per day from Cypress sand at 2,667-75 ft., which had been shot.

Seven dry hole wildcats were completed during the week. Only 22 new operations were started including these wildcats: W. O. Schock et al 1 M. Schmoke, NE SE SE 10-7n-5e, Effingham County; A. J Slagter 1 M. C. Holman, SE NE SW 5-4n-

6w, Madison County; Harry Hubbard 1 Doolin, SE SE SE 25-3s-5w, Washington County.

ILLINOIS WILDCAT COMPLETIONS

Clay County: National Associated 1 Maudlin estate, SW SE SE 35-3n-5e, dry at 308 ft. Lower Kincaid 1,847 ft., Cypress 2,572 ft., Benoist 2,731 ft., Aux Vases 2,778 ft., Ste. Genevieve 2,842 ft., McClosky 2,900 ft., St. Louis 2,988 ft.

Clinton County: National Associated 1 Andrew Kuhn, SW SE NW 28-1n-1w, dry at 1,731 ft. Glen Dean 1,103 ft., Cypress 1,325 ft., Benoist 1,451 ft., Aux Vases 1,509 ft., McClosky 1,685 ft.

Edwards County: Central Pipe Line 1 Bunting, NE NE SE 3-1s-14w, dry at 3,075 ft. Menard 2,112 ft., Barlow 2,580 ft., no Benoist or Aux Vases recorded, Ste. Genevieve 3,906 ft., McClosky 2,986 ft.

Jefferson County: Fox & Fox 1 Interstate Coal, SW SW SW 4-4s-2e, dry at 2,742 ft. Vienna 1,956 ft., Cypress 2,317 Ft., Aux Vases 2,544 ft., McClosky 2,673 ft., St. Louis 2,741 ft.

Marion County: B. W. Quick et al 1 Henning, SE NE NE 31-3n-1e, dry at 1,601 ft. Menard 1,085 ft., Cypress 1,454 ft., Benoist 1,568 ft., Benoist sand 1,575-1,601 ft.

Richland County: C. E. Brehm 1 M. Brehm, NW NE NE 11-2n-9e, dry at 3,258 ft. Menard 2,258 ft., Cypress 2,765 ft., McClosky 3,153 ft.

Wayne County: Pure 1 L. Miller, SE SE NW 27-2n-7e, dry at 3,102 ft. Tar Springs 2,440 ft., Cypress 2,758 ft., Aux Vases 2,984 ft., Fredonia 3,087 ft.

KANSAS

Richardson Pool Extended One Mile Southeast

PHILLIPS PETROLEUM CO. 1 Gilbert, SW SW NW 7-23-11w, has extended the Richardson pool of Stafford County about 1 mile southeast and is producing from the Arbuckle. The Arbuckle was cut at 3,697 ft., and at 3,704 ft., the well swabbed 12 bbl. of oil an hour on a preliminary test.

Barber County.—J. M. Huber Corporation has staked the No. 1 Clay, NE SE SW 28-30-13w, just ½ mile south of the Lion Oil Co. 1 Lemon, a gas discovery. The No. 1 Lemon was completed for 18,000,000 cu. ft. of gas from the Maquoketa.

Ellis County: Max Cohen 1 Madden estate, NW NW NE 4-13-17w, which opened the new Catherine, Northwest, pool has been given a pump potential of 106 bbl. from the Arbuckle lime. This new pool is about 1 mile west of the Catherine pool. Tops on the well were Lansing 3,324 ft., and Arbuckle 3,582 ft.

Meade County.—A big leasing play has been started by the Stanolind Oil & Gas Co. 1 Adams, SW SW SW 8-35-30w, which is now drilling below 7,200 ft. Commercial gas production was found in the upper Mississippi lime, cut at 5,861 ft., but the operators are drilling down to test for possible oil.

New locations reported for this week total 27, with only five new wildcats. Wildcat starts are scattered, with one apiece for Pratt, Rush, Russell, and Stanton counties.

KANSAS WILDCAT COMPLETIONS

Barber County: Lion 1 Lemon, SE NE NE 28-30-13w, gaged 18,000,000 cu. ft. gas from pay zone 4,528-45 ft., TD 4,548 ft., Viola 4,528 ft.

Ellis County: Carter 1 Matheson, SE SW 24-11-16w, dry, TD 3,464 ft., Arbuckle 3,415 ft.

Jefferson County: Magnolia 1 National Life, SE NE SE 15-10-19e, dry, TD 2,149 ft., Viola 2,133 ft.

Reno County: Sterling Drilling 1 Osenbaugh, SW SW SW 34-22-8w, dry, TD 4,080 ft., Simpson 3,961 ft.

Russell County: Carter 1 Wilson, NE SW 15-12-13w, dry, TD 3,485 ft., Arbuckle 3,456 ft.

SOUTHWEST TEXAS

Starr County Strike Flows 120 Bbl. Daily

CORPUS CHRISTI.—George Irving 1-B M. M. Garcia, wildcat discovery in Starr County, Block 12, Share 7-B, Porcion 91, 12 miles northeast of Rio Grande City and 2,000 ft. north of Boyle field, on 24-hour potential, flowed 120 bbl. through 9/64-in. choke, no water, tubing pressure 500 lb., casing pressure 950 lb., gas-oil ratio and gravity not reported, from 36 perforations at 4,121-27 ft., TD 4,264 ft., with 5½-in. casing at 4,250 ft.

Tide Water Associated Oil Co. 1 E. W. House, discovery, about 2 miles west of Kingsville field, Kleberg County, on 24-hour production test flowed 47 bbl. of dark green oil through ½-in. choke, tubing pressure 1,260 lb., casing pressure 1,400 lb., gas-oil ratio 842, gravity 37.2°. This production is from Frio sand perforations at 7,266-68 ft. TD is 8,650 with 5½-in. casing at 8,515 ft.

James Stewart 1 Mrs. Grace Gaffney, a wildcat, 3 miles southeast of Terrell field and 1½ miles north of San Antonio River in Victoria County, made 10-minute drillstem test at 5,012-20 ft., and recovered 250 ft. of oil, 20 ft. of mud, and had 220

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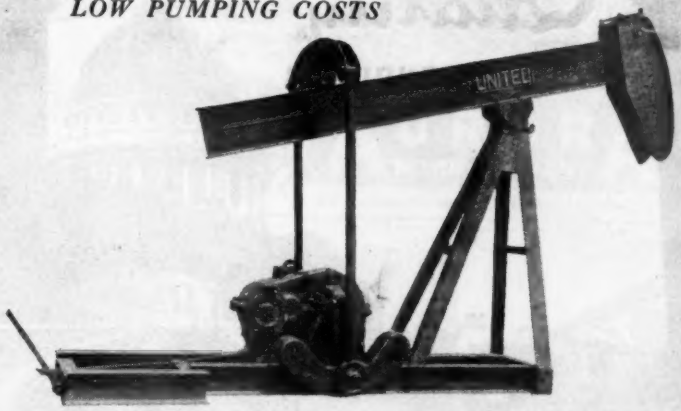

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lb. working pressure against ¼-in. choke. Operators are coring at 5,450 ft.

Navarro Oil Co. 1 Chamberlain, La Gloria field, Brooks County, in Ignacio Pena Survey, recovered 1,367 ft. of pipe line oil and 30 ft. of oil-cut mud, in 15 minutes on drill-stem test at 6,093-6,102 ft., using ¼-in. chokes. Working pressure was 342 lb., and bottom-hole pressures were 2,300 lb. flowing and 2,675 lb. shut in.

Hiawatha Oil & Gas Co. 30 Southland Life Insurance Co., Southland field, Duval County, flowed 11 bbl. of 60° slightly colored distillate in 15 hours through 5/32-in. and ⅞-in. chokes, tubing pressure 1,250 lb. and casing pressure 1,300 lb.

United Producing Co., Inc., 1 Emil Niemann, Bonnie View field, Refugio County, on 24-hour potential test, flowed 91.8 bbl., through ⅛-in. choke, tubing pressure 430 lb., casing pressure 900 lb., no water, gas-oil ratio 283, gravity 23.9°, from open hole at 4,570-76 ft., TD 4,576 ft.

SOUTHWEST TEXAS WILDCAT COMPLETIONS

Jim Hogg County: Sun Oil 16 Weil Bros., Santo Domingo de Abajo grant, dry at 5,705 ft.

Texon Royalty et al 1 Hector Vela, Sur. 108, 18 mi. SW of Hebbronville, dry at 2,850 ft.

Starr County: George Irving 1-B M. M. Garcia, wildcat discovery, Por. 91, Share 7-B, Blk. 12, 12 mi. NE of Rio Grande City, 2,000 ft. N of Boyle field, TD 4,264 ft., top sand 4,080 ft., perforated 4,121-27 ft. with 36 shots, PT 120 bbl. per day through 9/64-in. choke, tubing pressure 500 lb., casing pressure 950 lb., no water.

Victoria County: Sohio and Wiggins & McFerron 1 Albert J. Albrecht, Cecelia de la Garza Sur., 15 mi. westerly from Victoria, dry at 4,600 ft.

Webb County: Dulup Oil 6 Bruni, Albercas grant, Brown subd., Blk. 74, dry at 1,670 ft.

Zapata County: A. M. Lacey 1 Carlos Vela et al, Por. 24, 4 mi. NE of Lopeno, dry at 5,406 ft.

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ROCKY MOUNTAIN

Uintah Basin Receiving Renewed Attention

DENVER.—The opening of a major oil field in the Weber formation of Pennsylvania age at Rangely, Rio Blanco County, western Colorado, has resulted in more intensive examination of the great Uintah Basin by operators in search of prospective structures. Already some geophysical crews are at work in the area, making their headquarters at Vernal, and several structures have been blocked in anticipation of a wildcat play. The Uintah Basin is a vast province extending 200 miles east-west and of almost equal width in western Colorado and eastern Utah and is almost virgin territory from the exploration standpoint. It extends from the Unitah Mountains on the north to the Uncompahgre uplift on the south in Colorado and almost to San Rafael swell on the south in Utah, and from the Great Hogback in Rio Blanco County, on the Colorado side, to the Wasatch Mountain range on the west in Utah.

Small discovery on Brady block.—Texas Co., after drilling three dry holes to 1,500 to 1,800 ft. on its large Brady block in Pondera County, Montana, has made a small discovery in the Sunburst sand at 1 Weikum, NW NW NW 27-27n-2w. It had the Sunburst at 1,480-1,515 ft., which bailed 12½ bbl. of oil per day after a shot. Thre three dry holes were spaced in the form of a triangle and furnished subsurface geology which led to the location of the discovery well between two of these. Location has been made for 3 Schlepp to the northwest of 1 Weikum.

Second well at Kirby Creek.—Pacific Western Oil Corp. completed its 1 Kyne, SE SW SW 22-43n-92w, Kirby Creek, Hot Springs County, Wyoming, for 5 bbl. per hour from the Embar at 3,334-3,440 ft., an extension of nearly ½ mile to the southeast from its discovery which made 150 bbl. per day from the Embar.

Continental to test South Byron.—Continental Oil Co. has spudded in its 1 Prescott, SE SE SE 9-55n-96w, in a fault block 6 miles southeast of the nearest producer in the Byron field, Big Horn County, Wyoming. It is strictly wildcat, the only test in the vicinity being a well drilled ⅓ mile to the north in 1938 by the Taylor Oil Co. which went only to the Peay sand at 3,987 ft. in search of light oil in the Frontier. The Embar is the principal producing horizon at Byron and is found much deeper.

South Elk Basin shows more gas.—Continental Oil Co. 1 Ida Goodstein, NE SE SW 20-57-99, a wildcat south of the Elk Basin field, continues to show gas in sands as it drills toward the objective Tensleep. A drill-stem test in the Morrison at 5,654-86 ft. flowed at the rate of 2,000,000 cu. ft. per day. The 7⅝-in. was set at 5,702 ft. to protect the hole from a possible blowout in the upper horizons.

WYOMING WILDCAT COMPLETION

Hot Springs County, Grass Creek: Husky Refining 1 Kinney-Coastal Oil, SW SW SW 20-46n-98w, TD 4,244 ft., 7-in. on bottom, top Embar 4,166 ft., perf. 4,170-4,230 ft., 125 bbl. pipe-line oil first 24 hours and water cut of 50 per cent, 125 bbl. oil and 40 per cent cut second 24 hours, gravity 24°, ¼ mile extension of Embar horizon on southeast side of field.

MONTANA WILDCAT COMPLETIONS

Liberty County, Whitlash: Union Oil 1 Mahoney Unit, SW SW NE 22-37n-4e, TD 4,068 ft., Ellis-Madison 2,172 ft., oil

stains in core, top of Jefferson at 3,069 ft., top of Devonian at 2,845 ft., show of oil at 3,320 ft., elevation 3,939 ft, dry.

Pondera County, Brady Block: Texas 1 Weikum, NW NW NW 27-27n-2w, TD 1,517 ft., Sunburst sand 1,480-1,515 ft., 7-in. 1,485 ft., shot 50 qt. at 1,497-1,517 ft., bailed at rate of 12½ bbl. per day.

TEXAS GULF COAST

Smith Point Field Extended Northwest

HOUSTON.—Standard Oil Co. of Texas 1-110 State-Galveston Bay, is completing in perforations 8,126-36 ft. to extend the Smith Point field of Chambers County about 2,500 ft. to the northwest. Total depth of this well is 8,225 ft. with 7-in. casing set at 8,223 ft. The well flowed 124 bbl. of oil on 13-hour test through ⅛-in. choke, tubing pressure 1,445 lb., gas-oil ratio 845, gravity 41°.

American Republic Co. and Houston Oil Co. of Texas 3 H&TC-fee, Beech Creek field, Hardin County, cored sand in the Cockfield zone at 6,278-82 ft. carrying oil odor, and is coring ahead.

Atlantic Refining Co. 1 Houston-American, wildcat, in BBB&C Survey, Abstract 138, Tyler County, is reported preparing to perforate for a new test, at 8,432-42 ft. Test in perforations at 8,432-60 ft. had recovered 900 ft. of oil and 1,035 ft. of salt water.

UPPER GULF COAST WILDCAT COMPLETIONS

Wharton County: Salt Dome Oil et al 1 Joe Vitera, gas discovery, in Henry Mills Sur., 4 mi. NW of Louise, TD 5,591 ft., 5½-in. casing set near bottom, perforated 5,240-44 ft., completed as a gas well, no gage, and shut in.

Texas 1 H. R. Matzke, gas discovery, I&GN Sur., 2 mi. SW of Pierce, TD 6,345 ft., perforated 5,779-84 ft., 2-in. at 5,739 ft., PT flow 48,500,000 cu. ft. gas daily open, then shut in, tubing pressure 2,130 lb. in ¼-in. choke.

CANADIAN FIELDS

Vermilion Test Exploring Devonian

CHATHAM.—In the Vermilion field, eastern Alberta, Vermilion Consolidated 15, LSD 6, 21-49-6w4, standing at 4,031 ft. with casing set, is preparing to perforate and test from three horizons. This is the first well in the Vermilion field to test Devonian limestone.

Jumping Pound.—Shell Exploration Co. 4-24-J, LSD 4, 24-25-5w5, bottoming in Madison limestone at 9,947 ft., is closed in, pending decision as to further drilling, when the gas production from the Madison will be used as fuel. Bottom-hole pressure tests following a 24-hour shutin showed 3,910 lb., the highest ever officially recorded in Alberta.

North Central Turner Valley.—Royalite Oil 77, LSD 1, 2-20-3w5, with Madison limestone at 6,987-7,428 ft., had initial production of 463 bbl. daily. Location is in an area formerly neglected as it was thought unfavorable to large production.

Lloydminster.—In the Lloydminster field, eastern Alberta, General Petroleums 1, LSD, 14-49-1w4, finished at 1,950 ft., is making 8 bbl. daily of 14-gravity crude from the Cretaceous.

Coalspur.—In the Coalspur area of the northern foothills, Imperial-Coalspur 1,

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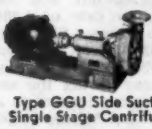

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DANVILLE, ILLINOIS

LSD 10, 3-49-21w5, is standing cemented in lower Benton formation at 10,430 ft. with some gas.

Steveville.—In the Steveville field, east of Calgary, Empire Petroleum 1, LSD 7, 11-19-11w4, is deepening in Devonian limestone after testing oil and gas shows at 4,076-86 and 4,149 ft. Neither show proved commercial, but porosity in the second horizon was more pronounced.

Folding Mountain.—On the Folding Mountain structure in the northern foothills, Jasper Syndicate 1, LSD 2, 19-49-6w5, has encountered the Madison limestone high and is drilling in lime below 2,005 ft.

APPALACHIAN FIELD

Washington County, Ohio, Yields Good Oil Well

PITTSBURGH.—In southeast Ohio, Section 13, Knox Township, Columbian County, Ohio Oil Co. has staked a location on the J. F. Wafler unit scheduled for the Oriskany sand. It is about ⅝ mile southeast of the discovery Oriskany gas well in the same township.

In Ludlow Township, Washington County, Ohio, Homer Newhart et al completed 6 Samuel Dickson, northeast Section 15 good for 125 bbl. before shot from Injun sand, total depth 1,368 ft. This is the second good well on the tract.

In Fayette County, Pennsylvania, Dr. J. O. Boyle completed a test on James Hoover farm in the Injun sand with a gage when shut in of 3,300,000 cu. ft. gas.

In Armstrong County, Apollo Gas Co. completed 783 Mathew Kral in Burrell Township with a gage of 852,000 cu. ft. gas from the Hundred Foot sand, 1,495 ft., gas 1,521 ft., total depth 1,527 ft.

West Virginia.—In Scott district, Putnam County, West Virginia, the test of Godfrey L. Cabot, Inc., on Summers & Quarrier topped the Oriskany sand at 4,665 ft. with gas showing at 4,665 ft. and 4,668-71 ft. After drilling through the sand, bottom 4,676 ft., the gage was only 59,000 cu. ft. but the well has not been shot.

In Jefferson district, Nicholas County, Columbian Carbon Co. completed 767 C. C. Dickinson as a gas well gaging 1,142,000 cu. ft. from the Injun sand at 1,796-1,827 ft., which was acidized after plugging back to 1,928 ft. from 2,047 ft. The rock pressure at end of 6 days was 550 lb.

In Crook district, Boone County, Hope Natural Gas Co. is completing 8,912 Loup Creek Colliery Co. with Maxton sand at 2,128-57 ft., gas gaging 103,000 cu. ft. at 2,145-57 ft., which was shot at 2,144-56 ft.

In Baileyville district, Wyoming County, Hope Natural Gas Co. bottomed its test, 8,952 N. R. & P. Consolidated Coal Co., at 1,260 ft. with gas pays at 785 ft., 989 ft. and at 1,014-17 ft. gas gaging 327,000 cu. ft. which increased to 492,000 cu. ft. at 1,067-75 ft. It was shot with 30 qt. with a tamp shot (1,018-86 ft.) which is now being cleaned out.

CALIFORNIA

Capitan Field Gets Two More Producing Zones

LOS ANGELES.—Shell Oil Co. has found two additional productive zones in the Capitan field of Santa Barbara County and both look very good from a production standpoint. Well 1-35 Covarrubias, on a formation test at 3,290-3,450 ft., flowed 107 bbl. of clean 39.2° gravity oil and 79,000 cu. ft. of natural gas per hour, indicating the existence of a commercial accumulation of oil and gas at this depth. From 3,544-3,642 ft. the well flowed 66 bbl. of clean 38.8° gravity oil and 79,200 cu. ft. of natural gas on a one-hour's test. The first formation test was at a daily rate of 2,568 bbl. and the second test was at a daily rate of 1,584 bbl. Between these two zones, Shell tested an interval at 3,442-3,540 ft. and found it good for about 5 bbl. per hour along with 118,000 cu. ft. of gas during the same period. All three zones are located in rocks of Sespe formation and Miocene age. Since making these formation tests, Shell has resumed drilling and is at present rotating ahead at 3,715 ft. preparatory to carrying this well on down for a conclusive deep test. Shell's 1-37 Covarrubias, the deep zone discovery well, will be carried down into the Eocene before being completed. The Eocene should be found within the next 1,000 ft. of hole.

In the Newhall Potrero field, Barnsdall Oil Co. is drilling ahead in 44 Rancho San Francisco in search of the Sesnon zone of Eocene age which has been found so highly productive at Aliso Canyon. A check at 10,720 ft. recently indicated this hole was still in Miocene rocks. Barnsdall has already found favorable indications in at least two intervals in this well and may be considered to have proved up at least one additional productive zone even though no formation test was made. In the Del Valle field, R. E. Havenstrite found water in 2 Liebhart at 9,565-9,681 ft. and is coring ahead. This well is located east of the Del Valle field and will prove up the existence of a new accumulation if successfully completed as a producing well. There is a good possibility that a zone found higher up in the hole may prove productive when tried out.

CALIFORNIA WILDCAT COMPLETIONS

Stanislaus County: Grayson district, Continental-Western Gulf. 1 Azevedo Comm., 27-4s-7e, formation test 3,460-

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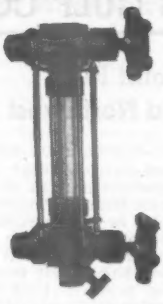

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Kern County: Delano district, O'Kane & Brain, 1 Wheeler, 20-25s-26e, no showings, bottomed in basement granite, TD 6,701 ft., dry.

Kern County: Stockdale district, Western Gulf 1 Stockdale-K.C.L., 5-30s-27e, no showings of importance, Macoma equivalent 4,309-4,708 ft., bottomed in gray sand, TD 5,992 ft., dry.

OHIO, KENTUCKY

New Gas Pool Opened in Lorain County From Clinton

COLUMBUS.—Glen Harmon 1 Wm. Buckingham, Lot 88, LaGrange Township, last week opened a new gas pool in Lorain County. The completion is a west offset to an oil well discovered last year. After gaging 750,000 cu. ft. natural from Clinton at 2,446-59 ft., the well was shut in at 2,166,000 cu. ft. with a rock pressure of 1,180 lb.

Ohio Fuel Gas Co. 1 J. H. Shelton, Section 24, Carlisle Township, Lorain County, extends the new Carlisle pool a location to the northeast. Clinton sand at 2,389-98 ft. and 2,406-11 ft. gaged 1,600,000 cu. ft. natural.

Ohio Fuel 1 W. G. Devies, Lot 37, extends a new pool in Westfield Township, Medina County, a location to the east. Sand was found at 3,124-33 ft. and gaged 1,070,000 cu. ft. natural

Belmont Quadrangle 10 Cleveland Park Board, Lot 89, Hinckley Township, Medina County, gaged 1,501,000 cu. ft. natural. Sand at 3,185-247 ft. had pay from 3,200-44 ft.

OHIO WILDCAT COMPLETION

Wayne County, Clinton Township: Kembrow Co. 1 E. A. Morris, Sec. 3, Clinton 3,090-104 ft., and 3,115-20 ft., dry, TD 3,162 ft.

WESTERN KENTUCKY

OWENSBORO.—Two miles south of the Smith Mills pool in Henderson County, Kentucky, Ashland Oil & Refining Co. 1 R. C. Gaines 14-P-21 was being made ready for a production test of Tar Springs sand at 1,941-60 ft. after drilling to a total depth of 2,799 ft. A 35-minute drill-stem test developed 25 ft. of clean oil.

The St. Vincent pool in Union County may be extended 2 miles by Carter Oil Co. 3 Margaret Drury, in 1-O-20, which developed clean oil in a drill-stem test of McClosky lime at 2,556-63 ft.

Four oil wells and five dry holes were completed in Western Kentucky during the week. There were no wildcat operations.

INDIANA

EVANSVILLE.—Three oil wells and seven dry holes were reported completed in Indiana in the course of the week, all in established fields. The best of the wells started at 57 bbl. per day.

Senate Group Back From Mediterranean Oil Survey

WASHINGTON.—Refineries were inspected and hearings were held in oil-producing areas of Iran by a Senate war investigating subcommittee which is back from a survey of the oil situation in the Mediterranean region and which is said to have prepared a voluminous report. The members, Senators Tunnell of Delaware, and Burton of Ohio, said they could not discuss their findings except before the full committee, headed by Senator Mead of New York.

LEGAL

WAR FOOD ADMINISTRATION, Farm Security Administration, Dallas, Texas. Sealed bids in duplicate will be received in this office until 3:00 o'clock P. M. (cwt), February 26, 1945, and then publicly opened, offering bonus for operating rights in connection with oil and gas leases on lands located in Harrison and Panola Counties, Texas, being a part of the Sabine Farms Project, Marshall, Texas. The project area of approximately 9,592 acres has been divided into six subdivisions for leasing purposes. An official subdivision plat of Sabine Farms Project is on file in the County Clerk's office of Harrison County, Texas. The United States owns an undivided three fourths interest in the mineral rights in four tracts and an undivided three eighths interest in the mineral rights in two tracts with the exception of specific reservations applicable to three tracts as set forth in the legal description included in the invitation. Further information regarding mineral rights and identification of the tracts to be leased may be obtained from a plat of the Sabine Farms Project entitled "General Layout Map" which will be furnished interested parties upon request. This Plat is available for inspection in the office of the Project Manager, Sabine Farms Project, Marshall, Texas, and in the Regional Office of this Administration, Dallas, Texas. Award of lease(s) will be made to bidders who can show sufficient experience and financial resources and prove citizenship. Interested parties may obtain bid documents and operating regulations from the office of the Regional Business Manager, Farm Security Administration, Parry Avenue at Commerce, Dallas, Texas.

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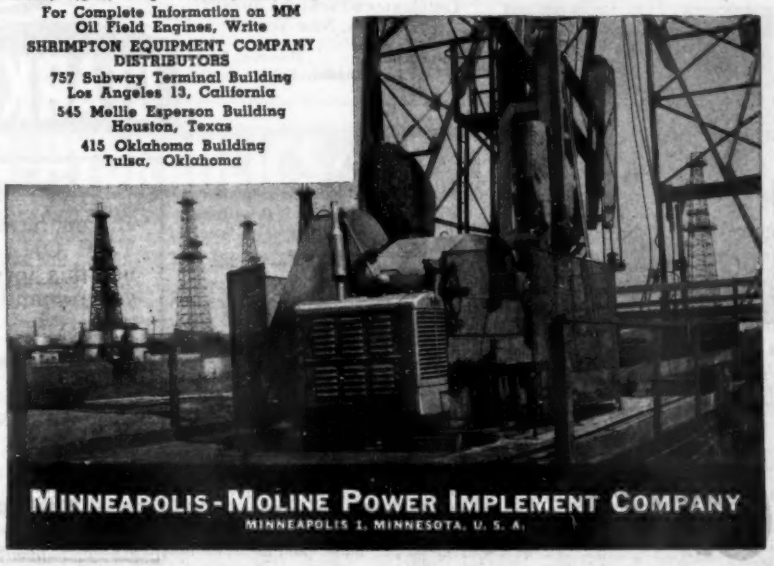

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WILDCAT COMPLETIONS AND DISCOVERIES

	Week ended Jan. 27, 1945					Cumulative total, 1945				
	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
Ohio	0	0	0	1	1	0	0	0	4	4
Indiana	0	0	0	0	0	0	0	0	0	0
Illinois	0	0	0	7	7	5	0	0	28	33
Kentucky	0	0	0	0	0	1	0	0	5	6
Michigan	0	0	0	1	1	0	0	0	17	17
Kansas	0	0	1	4	5	1	0	2	35	38
Neb., Mo., Iowa	0	0	0	0	0	0	0	0	5	5
Oklahoma	1	0	0	6	7	6	0	1	23	30
Texas:										
North Central	3	0	0	9	12	8	0	1	27	36
West	1	0	0	6	7	3	0	0	17	20
Panhandle	0	0	0	0	0	0	0	0	0	0
Eastern	0	0	0	0	0	3	0	0	4	7
Gulf Coast	0	0	2	1	3	3	0	3	24	30
Southwest	1	0	0	4	5	2	0	1	20	23
Total Texas	5	0	2	20	27	19	0	5	92	116
Louisiana:										
Northern	0	0	0	3	3	0	0	0	8	8
Southern	1	0	0	1	2	2	0	0	5	7
Total Louisiana	1	0	0	4	5	2	0	0	13	15
Arkansas	0	0	0	1	1	0	0	0	5	5
Mississippi	0	0	0	1	1	0	0	0	9	9
Ala., Ga., Florida	0	0	0	1	1	0	0	0	2	2
Montana	1	0	0	1	2	2	0	0	1	3
Wyoming	1	0	0	0	1	3	0	0	3	6
Colorado-Utah	0	0	0	0	0	0	0	0	2	2
New Mexico	1	0	0	0	1	2	0	0	5	7
California	0	0	0	7	7	0	0	1	19	20
Total United States	10	0	3	54	67	41	0	9	268	318
Total previous week	15	0	3	74	92					

LA.-ARK.

Dry Holes Outnumber New Oil and Gas Wells

SHREVEPORT.—Eight completions, two oil wells, two gas wells and four dry holes, three of which were wildcats, summed up the week's results in the North Louisiana fields. A 200-bbl. in the DeSoto-Red River field was the best of the new wells, that being Whitehurst Drilling Co. 1 Herold, 330 ft. north and 990 ft. east of the southwest corner of 1-12n-11w.

In the Arkansas fields Carter Oil Co. completed a failure in 1 O'Brien, NW SE NW 33-16-26, at 3,716 ft., in the Fouke field in Miller County.

Sam Gilardi 2 Wesley, NE SW SW 7-15-19, Stephens-Smart field (which lies in Columbia, Nevada and Ouachita counties) was good for 220 bbl. initially from pay at 3,932-51 ft.

NORTH LOUISIANA WILDCAT COMPLETIONS

Franklin Parish: American Liberty Oil 1 Holt, NW SE NE 11-16n-8e, dry, TD 3,405 ft.

Richland Parish: Roeser & Pendleton et al 1 Tensas Delta, SW SW 1-14n-5e, dry, TD 4,510 ft.

Melton Houston and Rogers Lacy 1 Duckworth estate, 430 ft. north and 330 ft. east of center 18-17n-10e, dry, TD 3,531 ft.

ARKANSAS WILDCAT COMPLETION

Union County: R. H. Crow, Tr., 1 Smith, NE NE NE 26-18s-15w, dry, TD 2,536 ft.

MISSISSIPPI

200 Bbl. Well Added to The Cranfield Pool

JACKSON, Miss. — In Adams County, Cranfield pool, California Co. 4 Radcliffe, 67-7n-1w, was completed for 200 bbl. per day through perforations at 10,320-60 ft., in the Massive sand.

Gulf Refining Co. 3 Bradshaw, a Marion County wildcat, in C SE NW 29-3n-17w, is dry at 9,622 ft.

Kirby Petroleum Co. was moving in material for 1 Griffith, NE SE SE 25-1n-17w, in the Langsdale field in Clarke County, and Charles E. Walters was moving in material for 1 McClellan, wildcat in C SE SE 4-10n-4w, 4 miles east of the Heidelberg field.

MISSISSIPPI WILDCAT COMPLETION

Covington County: Mt. Vernon Car Mfg. Co. 1 fee, NE NE 17-9n-16w, dry, TD 9,648 ft., lower Cretaceous 9,528 ft.

ALABAMA WILDCAT COMPLETION

Wilcox County: Southern Natural Gas 1 Stokes, SW NW 32-12n-5e, dry, TD 4,305 ft.

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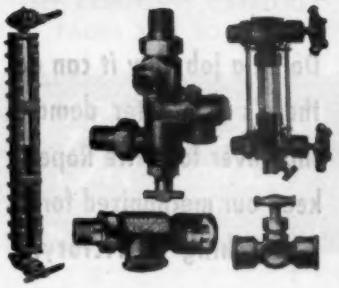

Penberthy liquid level gages of various types—injectors—ejectors—all so widely used throughout the oil industry because they have always been dependable under the most severe service conditions.

All are of rugged construction and made by an organization with 57 years experience in the manufacture of quality products.

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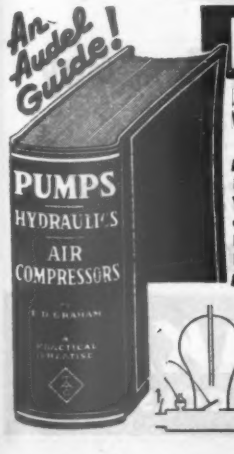

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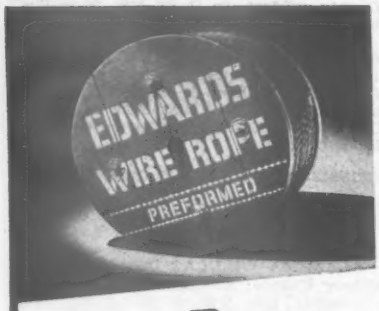

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E. H. EDWARDS COMPANY

Among the

Drilling Contractors

Can-Tex Drilling Co. of Calgary has the contract to drill a Devonian limestone test, Princess 76-22-A, LSD 12, 22-20-12w4, for California Standard in the Steveville-Princess field. Location is ¼ mile southeast of the discovery well.

Loukonen-Provost Co. is the name of a new firm that has been organized to engage in contract drilling, with offices in Long Beach, Calif. The firm has already started work on its first well, the Ohio Oil Co. 1 La Grande, near Covina, Calif. Partners in the frim are Roy A. Loukonen, R. A. and W. H. Provost.

Thornbury, Casner & Bentz have contracted with Union Oil Co. of California to drill three wells on contract, and have started work on the first of the wells. General partners in the firm are W. H. Thornburg, Ralph Casner, and J. O. Bentz.

Jenks & Kent Drilling Co. has filed a certificate of dissolution due to the retirement of Abbot B. Jenks. Hugh M. Kent will continue business under the name of **Hugh M. Kent Drilling Co.**, with offices in Los Angeles.

Earl Wakefield has the drilling contract on a standard-tool test the Cooperative Refinery Association is rigging up for in Russell County, Kansas. The wildcat test is the 1 Bear, in SW SE NE 13-12-14w.

Arrow Drilling Co. is the contractor on the Midco Oil Corp. 1 Gee, in NE NE NE 1-12n-8e, Okfuskee County, Oklahoma, 3 miles north of the Northeast Dill pool, a discovery it made in July 1943. Contractor is assembling materials for a test to the Cromwell sand.

Gordon Oil Co. has been awarded drilling contract on the Michigan Consolidated Gas Co. 2 E. Evans et al, in C SE 12-15n-8w, Mecosta County, Michigan.

H. H. & B. Drilling Co. is the contractor on the W. N. Bartlett and Ashland Oil & Refining Co. 1-A Kendall, in SE NW NE Section 27, Hughes County, Oklahoma, which found the lower Calvin sand at 776 ft.

Fain-Porter Drilling Co. has the contract on the Continental Oil Co. 4 Caldwell, in SW SW NE 26-17n-4w, Logan County, Oklahoma, and was moving in tools.

Beacon Drilling Co. has the contract on the Sinclair Prairie Oil Co. 1 Berryman, in NE NE NE 3-17n-24w, east of Grand, in Ellis County, Oklahoma. Forty-three feet of 16-in. surface pipe had been set.

Jim Collins is the drilling contractor on the C. W. Collin 1 Durius Fountain, in NE SW SW 4-13n-7w, Mecosta County, Michigan.

Kingery Drilling Co. has been awarded drilling contract on the Ashland Oil & Refining Co. 1 Whitney, in SE SW NW Section 27, Hughes County, Oklahoma. Cellar and pits had been dug.

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THE POSITIVE LEAK PREVENTER

MARKET QUOTATIONS

Prices as of January 30, 1945

(This service is abbreviated because most refinery products are selling at the Government's price ceilings. Quotations on other products than those shown here furnished on request. Quotations are f.o.b. plant in tank cars and in cents per gallon.)

REFINERY GASOLINE

Octane (A.S.T.M.)	76†	70-74
Mid-Continent*	6.75	5.875
Gulf Coast	6.75	5.625
Northeast Coast	....	9.075
California	....	6.50-7.00

*Basic Oklahoma Group 3. †1939 C.F.R. (research method).

NATURAL GASOLINE

Grades:	26-70	10-55
Oklahoma (Group 3)	4.750	5.700
North Texas (Dist. 1 Del.)	4.500	5.400
North Texas (f.o.b. plant)	4.375	5.250
North Louisiana (Dist. 1 Del.)	5.160	6.060
North Louisiana (f.o.b. plant)	4.375	5.250
California	4.875	5.500

CRUDE-OIL PRICES

Representative posted schedules per bbl.	
East Texas	$1.25
Conroe	1.43
Tepetate, Louisiana	1.18
Illinois basin	1.37
Pecos County, Texas	.95
Bradford, Pennsylvania	3.00
Van, Van Zandt County, Texas	1.00

Note: Exclusive of subsidy.

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity.	Signal Hill, Calif.	Oklahoma Kansas	Gulf Coast Texas	West Texas
18-18.9	$0.80	....	....	....
19-19.9	.84	....	$1.06	$0.70
20-20.9	.88	$0.85	1.08	.72
21-21.9	.92	.87	1.10	.74
22-22.9	.96	.89	1.12	.76
23-23.9	1.00	.91	1.14	.78
24-24.9	1.03	.93	1.16	.80
25-25.9	1.07	.95	1.18	.82
26-26.9	1.11	.97	1.20	.84
27-27.9	1.15	.99	1.22	.86
28-28.9	1.18	1.01	1.24	.88
29-29.9	1.20	1.03	1.26	.90
30-30.9	1.23	1.05	1.28	.92
31-31.9	....	1.07	1.30	.94
32-32.9	....	1.09	1.32	.96
33-33.9	....	1.11	1.34	.98
34-34.9	....	1.13	1.36	1.00
35-35.9	....	1.15	1.38	1.02
36-36.9	....	1.17	1.40	1.04
37-37.9	....	1.19	1.42	1.06
38-38.9	....	1.21	1.44	1.08
39-39.9	....	1.23	1.46	1.10
40 and above	....	1.25	1.48	1.12

*Includes Lea County, New Mexico.

A.P.I. REFINERY REPORT

Week ended January 20, 1945
(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks: Gasoline	Stocks: Distillate	Stocks: Residual
East Coast	735	12,354	7,858	5,215
Appalachian	160	4,351	578	537
Ill., Ind., Ky.	772	20,098	5,290	2,774
Okla., Kan., Mo.	390	8,759	1,970	1,284
Inland Texas	240	2,823	381	656
Tex. Gulf Coast	1,111	15,254	6,817	9,147
La. Gulf Coast	245	4,256	1,368	1,359
North La., Ark.	82	2,838	781	263
Rocky Mtn.	135	1,812	366	554
California	816	16,163	9,632	30,765
Total 1-20-45	4,686	88,708	35,041	52,554
Total 1-13-45	4,570	87,814	36,410	54,207
Total 1-22-44	4,372	79,444	38,112	53,121

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
January 20, 1945	221,628,000
January 13, 1945	221,114,000
January 22, 1944	238,814,000

*Excludes unrefinable California stocks.

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For oil field, locomotive type and marine boilers. Water shows black—steam shows white; the water level is unmistakable. U-Bolt construction is strongest and simplest to service. Glass replaced by simply removing nuts on face of gage . . . unnecessary to work between gage and boiler. Conforms with A.S.M.E., Federal and State requirements when used for pressures specified by their respective codes.

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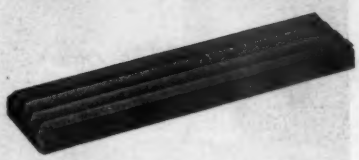

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SEE COMPOSITE CATALOG PAGES 3101 TO 3120

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PERSONALS

Alberta Discovery Poses Problems For Chonette

NEW production problems for W. C. Chonette are posed by the recent discovery of gas and distillate in a well of Shell Oil Co. of Canada, Ltd., in the Jumping Pound area of Alberta. But success in finding the answers to production problems is the reason Chonette is manager of Shell's Alberta division.

Upon graduating in petroleum engineering from University of California in 1927 the young man worked on cable tools and with a production crew in the Midway-Maricopa field, California, for a year and a half. Then he got a job as a roustabout for Shell Oil Co., Inc., in the Santa Fe Springs field during the deep-sand boom and soon was put on rotary. He remained in the field until 1930 when he was made an assistant engineer.

In 1933 Chonette was sent to The Hague for 6 months' training. Upon his return he was named division exploitation engineer at Ventura, and during the next 7 years he served in that capacity in each of Shell's three California divisions. In 1941 he was promoted to chief exploration engineer in the Pacific Coast territory. Two years later he was sent to Alberta to assume the responsibilities of the post he now fills. During the past year he has had charge of exploration and drilling, with the perplexities that go with the job.

S. Morse Willis has resigned as manager of the central geological division of The Carter Oil Co. to open an office in Tulsa as a consultant.

O. Hoyt Williams and **Nicholas Menshih** have joined the chemical products department of Phillips Petroleum Co., Bartlesville, Okla. Williams had been serving as chief of the chemical section in the Dallas district office of Chemical Warfare Procurement. Menshih, who graduated in chemistry from University of California, had been supervising process-development work for Standard Oil Development Co. for the past 7½ years. **T. M. Underwood**, formerly in charge of engineering design at the company's Borger, Tex., refinery, has been transferred to the chemical products department in Bartlesville. **J. E. Hughes**, for the past 2 years in the construction division of Petroleum Administration for War, has returned to Phillips and is now in the Perco division of the chemical products department.

LeRoy M. Edwards, vice president of Southern California Gas Co. and Southern Counties Gas Co., has been chosen president of Los Angeles Chamber of Commerce.

David Proctor, secretary and assistant general counsel of Gulf Oil Corp., Pittsburgh, has been made a member of the American petroleum industries committee of American Petroleum Institute. Proctor graduated from University of Texas with an LL.B. degree. He practiced law in Victoria, Tex., before joining Gulf about 26 years ago.

P. A. Frye, executive secretary of Louisiana Public Service Commission, has been named chairman of the new gas conservation committee.

John J. Hill, formerly division superintendent of main-line stations for Stanolind Pipe Line Co., has been promoted to superintendent of the company's Texas division. His office will continue to be in Fort Worth. He succeeds **O. H. Powell**, who retired after 42 years of continuous service with pipe-line companies in the Mid-Continent region.

L. C. DECIUS

L. C. Decius, vice president of Tide Water Associated Oil Co., Los Angeles, has been appointed director of exploration for the Associated division. Decius, in the company's service more than 29 years, has had wide experience in geological and exploratory operations in this and other countries. **F. A. Menken** has been named assistant director. The company has announced an expanded exploration and development program.

Lt. Col. Walter B. Jones has been returned to civilian status by the U.S. Army, resuming his former duties as state geologist of Alabama. **Dr. Stewart J. Lloyd** has been acting state geologist.

G. E. Chew has been named assistant superintendent of Sun Oil Co.'s Marcus Hook refinery, in charge of the personnel division. He formerly was personnel manager. He is succeeded in his former position by **H. E. Lawton**, formerly assistant manager of the personnel division.

F. R. Frederick, who was senior exploitation engineer at Lake Charles, La., for Shell Oil Co., Inc., has been promoted to district superintendent of the Iowa district in that state. **W. S. Pike, Jr.**, has been advanced from assistant district geologist in Houston to acting district geologist in Baltimore.

Dr. W. L. Moreman, Oklahoma City, district geologist in Oklahoma for Magnolia Petroleum Co., has been awarded a fellowship in Geological Society of America. He received his B.S. and M.S. degrees from Texas Christian University and his Ph.D. from University of Kansas. He then taught at Texas Christian for 2 years before joining Magnolia.

A. J. Donnelly, manager of industrial relations for General Petroleum Corp., Los Angeles, has been elected a director. Donnelly, an alumnus of

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University of Southern California, will retain his former post.

L. D. Coady, formerly with The Atlantic Refining Co., has joined American Liberty Oil Co., Dallas, as vice president and chairman of the executive committee of that company and of its affiliated pipe-line, refining and operating companies.

Lawrence O. Holloway, district superintendent for Humble Oil & Refining Co. in the Talco, Tex., district, has been transferred to the Pickton district, Winnsboro, Tex. **O. Lee Furse** and **Clarence N. Hunt,** district petroleum engineers, have exchanged positions. Furse, who was stationed in the London district, Overton, Tex., is now in the Hobbs, N. M., district. Hunt, who was at Hobbs, is now at Overton. **C. E. Capers** has been transferred from the Louisiana division to the Gulf Coast division as district chief clerk. **Roy J. Downey** has been transferred from the West Texas division to the Louisiana division as division chief clerk. **Lee Gallagher,** who was assistant division chief clerk in the Southwest Texas division, has been promoted to Downey's former post. **B. P. Guyton,** who was district chief clerk of the Hobbs, N. M., district, has been made assistant division chief clerk of the West Texas division. **A. J. Bedford,** formerly assistant division chief clerk of the West Texas division, has been moved to the Southwest Texas division to take Gallagher's former place. Guyton's former post at Hobbs has been filled by transferring **G. R. Van Landingham,** formerly district chief clerk of the Wasson district, Denver City, Tex. **M. L. Weatherall** was promoted to district chief clerk at Denver City.

James A. Boland, chief clerk in the Meadville, Pa., office of United Natural Gas Co. since 1941, has been appointed acting agent for the Meadville district, succeeding the late Frank A. Fairchild.

CALENDAR

February

American Society of Lubrication Engineers, first national convention, Stevens Hotel, Chicago, February 8-9.

April 1945

Midwest Power Conference, eighth annual meeting, Palmer House, Chicago April 9 and 10.

I.P.A.A., midyear directors meeting, New Orleans, La., April 16-18.

October 1945

Texas Mid-Continent Oil and Gas Association, Rice Hotel, Houston, October 4-6

I.P.A.A., annual membership meeting convention city to be selected later, October 15, 16 and 17.

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ENGINEERS: Preferably with chemical background. For technical sales work on chemicals dealing with aviation gasoline and oil refinery work. Experience preferred—plant production, laboratory work in the petroleum, lubricant, or similar industries. Age between 25-40 years. Dependable, good personality. Box A-391, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED by consulting organization: Petroleum engineers with Hayward mud logging experience or its equivalent. Immediate openings in Venezuela, excellent opportunity for advancement to managerial positions throughout the world. Box A-290, The Oil and Gas Journal, Tulsa, Okla.

WANTED: MECHANICAL ENGINEER who knows something about drafting. John Zink Company, 4401 South Peoria, Tulsa, Oklahoma.

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San Francisco 4, California

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CHEMICAL ENGINEER WANTED: Chemist or Chemical Engineer with Bachelor's Degree wanted to supervise essential natural gas processing plant laboratory. Southwest location. Should have several years experience refinery or larger natural gasoline plants. Submit complete details education, experience, personal data, salaries received and expected, recent photo. Employment subject to W.M.C. regulations. Box A-381, The Oil and Gas Journal, Tulsa 1, Oklahoma.

WANTED: Refinery stillman and stillman helper, Middle West location. State full experience, qualifications, etc. Box A-405, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL ACCOUNTANT to act as office manager and treasurer for independent company in Rocky Mountain area. Knowledge of production, drilling, refining and marketing accounting required. Give full details including salary expected and when available. Box A-406, The Oil and Gas Journal, Tulsa, Oklahoma.

MECHANICAL ENGINEER, leading manufacturer of drilling and production tools, located in Southern California, has opening for man, 25-45, pref. M.E. degree, should have had some experience in design and/or oil field operation. We sincerely believe this to be a worthwhile opportunity for the right man. Salary will be in line with past record and ability. Write fully giving outline of personal data and experience for past ten years. Enclose small photo if possible. Box A-393, The Oil and Gas Journal, Tulsa, Oklahoma.

TECHNICAL SALESMAN WANTED

Technical salesman with experience in petroleum research or production. Sales experience not essential but desirable. Excellent opportunity with old, well-established chemical company in Philadelphia area, now engaged in war work. Good postwar possibilities. Include education, experience, salary expected, age, draft status and snapshot in first letter. Box A-403, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

TWENTY years, experience in operations, topping, cracking, gas compression and recovery, light ends fractionation, light and heavy treating. Have statement of availability. South or west. Box A-385, The Oil and Gas Journal, Tulsa, Oklahoma.

Aggressive, experienced, production man desires connection in oil production or selling activity in Tulsa area. Have law degree and can handle title work. Early forties, 4-HA. Box A-384, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: B. S. degree and graduate studies in engineering and geophysics; extensive and varied experience with major oil companies and independent operators in domestic and foreign fields; seeks position with oil company or well financed individual operator. Box A-380, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Engineer, Graduate with 15 years experience in all branches of production including: field operations, development, valuation, governmental regulations, and research; interested in responsible position with opportunity for improvement. Address box A-396,. The Oil and Gas Journal. Tulsa, Oklahoma.

FIELD Superintendent. Draft exempt. Twenty-three years experience—last ten as field superintendent and assistant manager. Thoroughly familiar with drilling and production work. Now employed. Desires connection with aggressive Mid-Continent operator. Engineering graduate. Sober. Industrious. Box A-410, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE, oil country equipment, with manufacturing, engineering and sales background, seeks connection. Would purchase interest. Best references furnished. Address Box A-409, The Oil and Gas Journal, Tulsa, Oklahoma.

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MIDDLE age man experienced in Le... Titles—Leases—Rentals, etc. wishes empl... ment. Either office or field. Any locati... Box A-385, The Oil and Gas Journal, Tul... Oklahoma.

WANTED: Refinery Position as Supe... intendent or Assistant. 25 years' exper... ence in Refinery Operation of Liquid ... Vapor Phase Cracking, Skimming ... Tube Still Topping and Shell Still La... Oil Operations. Box A-395, The Oil ... Gas Journal, Tulsa, Okla.

REGISTERED CIVIL ENGINEER ... Graduate Geologist. Age 38. Experience... in supervision of design, layout, construc... tion and field engineering; land work. De... sires position of responsibility. Immediate... ly available. Box A-394, The Oil and Ga... Journal, Tulsa, Oklahoma.

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Graduate Engineer; 21 years general expe... rience with top ranking contracting Eng... neers and Constructors; also, major ... companies on all types of refinery unit... and pipe line projects both domestic an... foreign. Excellent organizer, very efficien... and a broad acquaintance in the constru... tion field and associated industries. Desi... to make a change which would be mutuall... advantageous. 43 years of age; experienc... acquired "the hard money way." Box A-40... The Oil and Gas Journal, Tulsa, Oklahom...

MAN age 38 available for productio... supt. Capable. 20 years field experienc... Technical background. Box A-407, The O... and Gas Journal, Tulsa, Oklahoma.

INSTRUMENT Engineer, age 34, 14 yea... experience. Majority of this time spent i... oil refinery construction and maintenanc... 1½ years foreign construction experienc... Can handle instrumentation from any ang... Electrical or pneumatic controls. Prefer fo... eign construction work. Available abo... March 1. Box A-401, The Oil and Gas Jou... nal. Tulsa. Oklahoma.

GEOLOGY graduate (woman) with cours... in petroleum engineering desires positio... with progressive concern. No territori... restrictions. Available March 26. B... A-400, The Oil and Gas Journal, Tuls... Oklahoma.

PETROLEUM ENGINEER: 19 years ge... eral experience in production. Past fi... years as engineer. Age 40, available. Bo... A-402, The Oil and Gas Journal, Tuls... Oklahoma.

REFINERY executive of 17 years exper... ence in processing petroleum products, de... sires employment in managerial capacit... with small refinery in Southwest are... Box A-404, The Oil and Gas Journal, Tuls... Oklahoma.

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Sublet medium size outside private offic... to permanent tenant. Available Feb. 1, ex... cellent address and reasonable rental. Bo... A-383, The Oil and Gas Journal, Tulsa... Oklahoma.

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PATENTS, Trade-Marks, Booklet, "Gen... eral Information Concerning Inventions an... Patents" and "Free Schedule" sent withou... obligation. Established 1915. Lancaster, Al... wine & Rommel, Suite 418, Bowen Bldg... Washington 5, D. C.

EQUIPMENT WANTED

WANTED: REPAIRABLE 50 to 350 3½... inch Hydril twin pins to fit 3½ O.D. inte... nal flush external upset drill pipe. Standar... Oil Field Supply Co., Houston, Texas. Tel... phone Preston 8271, L.D. 2195.

WANTED: Three boilers, 100 horse powe... 275 or 300 pounds working pressure. O... field type. Must stand inspection. A. A. Gi... bert Pipe and Supply Co., Shreveport, Lou... siana.

WANTED TO BUY: All types of construc... tion and pipe line equipment—cash waitin...
AIR COMPRESSORS RENTAL COMPANY
2324 East 105th Street
Cleveland, Ohio
Tel. GArfield 0500

EQUIPMENT WANTED: Pulling unit an... clean-out machine complete for wells 5,00... with 2⅛" tubing H. D. Biles, Box 710, For... Worth, Texas.

WANTED

Unlimited quantity of Structural Steel — Pipe — Tubing Casing and Valves, all sizes

SONKEN-GALAMBA CORP.
Kansas City (18), Kansas